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State of Ohio Environmental Protection Agency

## Southeast District Office

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Bob Taft, Governor  
Christopher Jones, Director

October 7, 1999

RE: US DOE-PORTS  
PIKE COUNTY  
OH ID# 466-0865

## DERR CORRESPONDENCE

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P.O. Box 700  
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## RE: THE X-734 LANDFILL AREA DECISION DOCUMENT

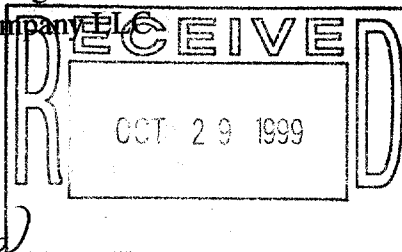
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If you have any questions, please do not hesitate to call.

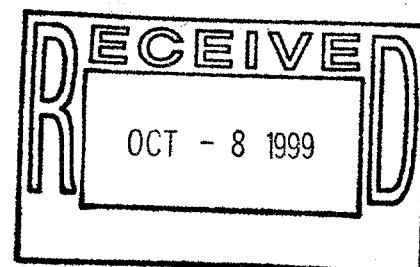
Sincerely,

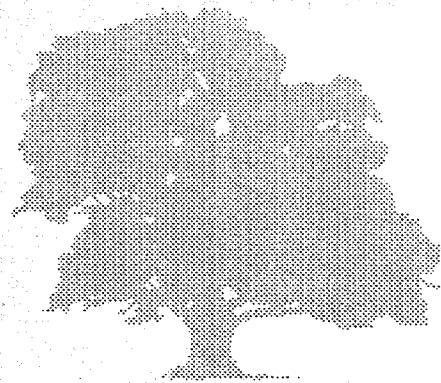
Maria Galanti  
Site Coordinator  
Division of Emergency and Remedial Response

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cc: Dewintus Perkins, USDOE  
Gene Jablonowski, USEPA, Region V  
Jim King, Bechtel-Jacobs Company, LLC*N. Wiles**N. Dayton**R. Richmond**Admin. Records*

RECORD COPY





**THE DECISION DOCUMENT FOR THE  
X-734 LANDFILL AREA IN QUADRANT IV  
OF THE PORTSMOUTH GASEOUS DIFFUSION PLANT**

*Ohio EPA  
September 1999*



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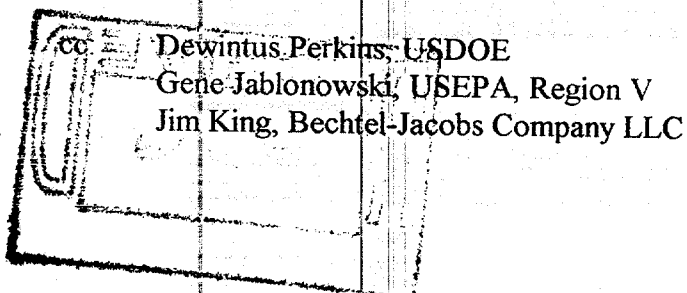
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Division of Emergency and Remedial Response

MG/mg



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### List of Acronyms

<b>ARARs:</b>	Applicable or Relevant and Appropriate Requirements
<b>Bedford:</b>	Bedford shale
<b>BERA:</b>	Baseline Ecological Risk Assessment
<b>BRA:</b>	Baseline Risk Assessment
<b>CERCLA :</b>	Comprehensive Environmental Response, Compensation and Liability Act (Superfund Law)
<b>Ci/hr:</b>	Curies per hour
<b>cm<sup>2</sup>/sec:</b>	Square centimeters per second
<b>CMS:</b>	Corrective Measures Study
<b>CAS:</b>	Cleanup Alternatives Study
<b>COC:</b>	Chemicals of Concern
<b>Cuyahoga:</b>	Cuyahoga shale
<b>D&amp;D:</b>	Decontamination and Decommissioning
<b>DDAGW</b>	Division of Drinking and Ground Water
<b>DHWM</b>	Division of Hazardous Waste Management
<b>DOCC:</b>	Description of Current Conditions
<b>ED:</b>	Exposure Duration
<b>ELCR:</b>	Excess Lifetime Cancer Risk Level
<b>fissile:</b>	Refers to a shale that easily splits or cleaves
<b>ft<sup>2</sup>:</b>	Square foot
<b>ft<sup>3</sup>:</b>	Cubic foot
<b>ft/d:</b>	Feet per Day
<b>ft<sup>2</sup>/d:</b>	Square feet per day
<b>ft<sup>3</sup>/d:</b>	Cubic feet per day
<b>Gallia:</b>	Gallia sand and gravel
<b>gal/month:</b>	Gallons per month
<b>gal/yr:</b>	gallons per year
<b>GC:</b>	Gas chromatograph
<b>gpd:</b>	Gallons per day
<b>gpm:</b>	Gallons per minute
<b>IGWMP</b>	Integrated Ground Water Monitoring Plan
<b>in/yr:</b>	Inches per year
<b>IRM:</b>	Interim Remedial Measure

kg/yr:	Kilograms per year
lbs:	Pounds
LBC:	Little Beaver Creek
LMES:	Lockheed Martin Energy Systems
LMUS:	Lockheed Martin Utility Services
m <sup>3</sup> /day:	Cubic meters per day
mg/l:	Milligrams per liter
mg/kg:	Milligrams per kilogram
mg/m <sup>3</sup> :	Milligrams per cubic meter
mgd:	Million gallons per day
Minford:	Minford silt and clay
NCP:	National Oil and Hazardous Substances Pollution Contingency Plan
ND:	Not detected
NDD:	North Drainage Ditch
NEDD:	North East Drainage Ditch
NEPA:	National Environmental Policy Act
NPDES:	National Pollution Discharge Elimination System
OAC:	Ohio Administrative Code (Rules/Regulations developed as directed by law)
Ohio EPA:	Ohio Environmental Protection Agency
PAHs:	Polycyclic (or polynuclear) aromatic hydrocarbons
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene
pCi/l:	Picocuries per liter
PERA:	Preliminary Ecological Risk Assessment
PORTS:	Portsmouth Gaseous Diffusion Plant
ppb:	Parts per billion
ppm:	Parts per million
Preferred Plan:	The plan developed by Ohio EPA and US EPA that identifies the preferred alternative for cleanup at a SWMU
PRG	Preliminary Remedial Goal
QI	Quadrant I (QII = Quad II, etc.)
RAGS	Risk Assessment Guidance for Superfund
RCRA:	Resource Conservation and Recovery Act
RFI:	RCRA Facility Investigation

<b>RME:</b>	Reasonable Maximum Exposure
<b>Sunbury:</b>	Sunbury shale
<b>SVOCs:</b>	Semivolatile Organic Compounds
<b>SWMUs:</b>	Solid Waste Management Unit
<b>Tc-99:</b>	Technetium-99
<b>TCE:</b>	Trichloroethylene - A volatile organic compound commonly used in industrial degreasing operations.
<b>TSCA</b>	Toxic Substance Control Act
<b>ug/hr:</b>	Micrograms per hour
<b>ug/kg:</b>	Micrograms per kilogram
<b>ug/l:</b>	Micrograms per liter
<b>ug/m<sup>3</sup>:</b>	Micrograms per cubic meter
<b>U.S. DOE:</b>	United States Department of Energy
<b>U.S. EPA:</b>	United States Environmental Protection Agency
<b>VOCs:</b>	Volatile Organic Compounds
<b>VC</b>	Vinyl Chloride
<b>yd<sup>3</sup></b>	Cubic Yards

## PART 1: DECLARATION STATEMENT

## DECLARATION STATEMENT

### SITE NAME AND LOCATION

US Department of Energy  
Portsmouth Gaseous Diffusion Plant (PORTS)  
Quadrant IV; the X-734, X-734A and X-734B Landfill Area  
Piketon, Ohio

### STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial actions for the Portsmouth Gaseous Diffusion Plant (PORTS), X-734, X-734A and X-734B Landfill Area in Quadrant IV, on the US Department of Energy (US DOE) Reservation in Piketon, Ohio. These actions were chosen in accordance with the Resource Conservation and Recovery Act (RCRA) of 1976, the Comprehensive Environmental Response, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Hazardous and Solid Waste amendments (HWSA) of 1984. These Decisions are based on the administrative record for this response action. The US DOE site is being cleaned up under a Consent Decree between US DOE and the State of Ohio, and an Administrative Order by Consent (AOC) signed by US DOE and the United States Environmental Protection Agency (US EPA). Both legal agreements were signed in 1989. US DOE, Ohio EPA and US EPA entered into a Administrative Consent Order in 1997 which granted the Ohio EPA the authority to conduct the day to day activity at the Portsmouth site.

Documentation for the selection of these remedial actions are contained in the administrative record maintained at the US DOE Environmental Information Center in Piketon, Ohio and at the Ohio EPA Southeast District Office in Logan, Ohio. The specific documents include but

26 are not limited to the Q IV Final RFI Report (Q IV RFI) (DOE 1996a), the Baseline Ecological  
27 Risk Assessment (BERA) (DOE 1994b), the Air RFI (DOE 1994c), the Background Sampling  
28 Investigation of Soil and Groundwater (DOE 1996) and the Ohio EPA Preferred Plan  
29 (Preferred Plan) (Ohio EPA 1999), and other documents contained in the administrative record  
30 file for this response action. The most current Administrative File indexes provided in  
31 Appendix a of this Decision Document.

## 32 ASSESSMENT OF THE SITE

33 Actual or threatened releases of hazardous substances from Quadrant IV, if not addressed by  
34 implementing the response actions selected in this Decision Document, may present a current  
35 or future risk to public health, welfare, or the environment.

## 36 DESCRIPTION OF THE SELECTED REMEDIES

37 Quadrant IV occupies the northern portion of the PORTS Reservation (*Figure 1.2*) The  
38 boundaries of Quadrant IV were established with respect to the surface-water and groundwater  
39 flow and drainage patterns. *The X-734 Landfill Area* (consisting of the X-734 Old Sanitary  
40 Landfill, the X-734A Construction Spoils Landfill, and the X-734B Construction Spoils  
41 Landfill is located in the Northwestern portion of Quadrant IV. (*Figure 2.1*).

42 *The X-734 Area* (consisting of the X-734 Old Sanitary Landfill, the X-734A Construction  
43 Spoils Landfill, and the X-734B Construction Spoils Landfill). Five alternatives for the X-734  
44 Area were evaluated (#1 No Action, #2 Institutional Controls, #3a Multi Media Cap, #3b  
45 Multi Media Cap and Leachate Collection Trench, and #4 Multi Media Cap at X-734/X-734A,  
46 Soil Cap at X-734B and Phytoremediation).

47  
48 The selected remedial alternative for the X-734 Landfill Area SWMU is Alternative 4.

Alternative 4 consists of institutional controls and containment (Multimedia Cap at X-734/X-734A, Soil Cap at X-734B, and Phytoremediation.) Alternative 4 has been designed to contain the soil, waste, and debris of the landfills. The alternative would not treat or remove any waste from the landfills; however, contaminated groundwater may be removed and treated by phytoremediation if contaminants migrate from beneath the X-734B construction and demolition debris landfill. Soil, waste, and other debris would be contained under a multimedia cap or soil cap to prevent potential for contaminant migration from the landfills. Phytoremediation (trees) would also be used downgradient of X-734B to capture and remediate any groundwater that could potentially migrate from beneath the landfill.

## STATUTORY DETERMINATIONS AND REMEDY SELECTION STANDARDS

The selected remedy meets the CERCLA statutory determination because it is protective of human health and the environment, complies with federal and State of Ohio requirements that are legally applicable or relevant and appropriate to the remedial action and are cost-effective.

The selected remedy uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The selected remedy complies with RCRA remedial selection standards because they protect human health and the environment; control the source of releases so as to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment; and comply with applicable standards for management of wastes. Media cleanup levels were established for the X-734 remedial action.

Implementation of the selected remedy at X-734 landfill area is easily accomplished, cost effective and is expected to provide both long and short term effectiveness. The selected remedy at X-734 will reduce mobility of the contaminants in the landfill area. This alternative requires the landfill to be capped in accordance with Ohio Solid/Hazardous waste requirements, and includes

74 institutional controls to prevent inappropriately access and development on the landfill. This  
75 alternative provides the best balance of trade-offs when considering the criteria used to evaluate  
76 the remedies presented in the CAS/CMS. The agency believes that this remedy will be protective  
77 of human health and the environment by containing the landfilled wastes. This alternative meets  
78 ARARs, is cost-effective, and will provide long-term effectiveness.

79 For evaluation purposes, a multimedia cap design and a construction and demolition debris cap  
80 was described for this alternative in the CAS/CMS. The multimedia cap would consist of the  
81 following layers, from bottom to top: a compacted soil subgrade, a geosynthetic clay liner (GCL),  
82 a flexible membrane liner (FML), a drainage layer, a frost protection layer, and a vegetative layer  
83 to prevent erosion. While Ohio EPA does not anticipate changes to this conceptual design, actual  
84 design details will be determined during the Corrective Measures Implementation (CMI).  
85 However, the final design must comply with Subtitle C/D and Ohio Solid/Hazardous Waste  
86 capping requirements.

87 The collection trench described in Alternative 3b was considered; however, because significant  
88 groundwater contamination does not currently exist, and because the cap is expected to eliminate  
89 or significantly decrease leachate generation from the landfill, it was determined that a collection  
90 trench is not necessary at this time. If site conditions change, a collection trench and associated  
91 treatment components could be added at a later date. The mobility of the contaminants will be  
92 contained through the ability of the selected remedial alternative to reduce the levels of  
93 contaminants in groundwater. These remedies may result in some hazardous substances remaining  
94 on site for a period of time; therefore, a review will be conducted no less often than every five (5)  
95 years after commencement of the remedial actions to insure that the remedies selected continue  
96 to provide adequate protection of human health and the environment.



## PART 2: DECISION SUMMARY

## 98 1.0 SITE NAME, LOCATION, AND DESCRIPTION

99 The PORTS facility was constructed between 1952 and 1956 and is owned by U.S. DOE. The  
100 active portion of the PORTS plant occupies approximately 1,000 acres of a 3,714-acre U.S.  
101 DOE reservation in south central Ohio, approximately 80 miles south of Columbus, 20 miles  
102 north of Portsmouth, and 1 mile east of U.S. Route 23, near Piketon (*Figure 1.1*). The  
103 immediate region surrounding the site consists of Pike County, Scioto County, Jackson  
104 County, and Ross County. Approximately 24,250 people reside in Pike County (Energy  
105 Systems 1997a), and scattered rural development is typical. Piketon is the nearest town,  
106 approximately 5 miles north of the facility on U.S. Route 23. Piketon had an estimated  
107 population of 1,717 in 1990. The county's largest community, Waverly, has approximately  
108 4,500 residents and is situated 12 miles north of the facility.

109 Land within a 5-mile radius of PORTS is primarily undeveloped, including cropland,  
110 woodlots, pasture, and forest. This distribution includes approximately 25,000 acres of  
111 farmland and 25,000 acres of forest. There is approximately 500 acres of urban land within  
112 the same radius (Energy Systems, 1993).

113 The PORTS facility occupies an upland area of southern Ohio with an average land surface  
114 elevation of 670 feet above mean sea level. The terrain surrounding the plant site consists of  
115 marginal farmland and wooded hills, generally with less than 100 feet of relief. The plant is  
116 located within a mile-wide abandoned river valley.

117 The geology of the PORTS plant site consists of unconsolidated material overlying bedrock  
118 formations. The unconsolidated material is known as the Teays formation. The Teays  
119 formation is composed of two members, the Minford silt and clay (Minford), and the Gallia  
120 sand and gravel (Gallia). The bedrock formation underlying the Teays formation are, in  
121 descending order, the Sunbury shale, the Berea sandstone, and the Bedford shale.

122 For purposes of the RCRA Facility Investigation (RFI), the PORTS facility has been separated

into quadrants (*Figure II*). Each quadrant roughly corresponds to the uppermost groundwater flow paths beneath the site. The PORTS groundwater system includes two water-bearing units, the Berea Sandstone bedrock and the unconsolidated Gallia, and two aquitards, the Sunbury Shale (Sunbury) and the unconsolidated Minford. Although the Minford silt does not transmit groundwater as readily as Gallia, the basal silt portion of the Minford is generally grouped with the Gallia as part of the uppermost water-bearing unit at the PORTS site.

Creeks and holding ponds are the most important surface water features at the PORTS plant site. The PORTS site is drained by Little Beaver Creek, Big Run Creek, the West Drainage Ditch, and the unnamed southwest drainage ditch. Sources of water for the surface water flow system include precipitation run-off, groundwater discharge and effluent from plant processes. All surface water from the plant site eventually drains into the Scioto River which flows north to south approximately 1 mile west of the plant. The Scioto River is approximately 120 ft. lower in elevation than the PORTS site.

## 2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The principal process at the PORTS facility is the separation of uranium isotopes via gaseous diffusion. The PORTS facility has been operating since 1954 enriching uranium for use in commercial reactors and for use by the U.S. Navy in power reactors in the nuclear Navy. Production of enriched uranium for use by the Navy was ceased in 1991. The production facilities are owned by U.S. DOE and have been leased by the United States Enrichment Corporation since 1993. The United States Enrichment Corporation became private in 1998. Other portions of the site are leased to the Ohio National Guard and the Defense Logistics Agency. U.S. DOE remains the owner of the property. DOE's mission at the site has changed to environmental restoration, waste management, removal of highly enriched uranium and the operation of non leased facilities.

147 Support operations for the production of enriched uranium include the feed and withdrawal of  
148 material from the primary process, water treatment for sanitary and cooling purposes,  
149 decontamination of equipment removed from the primary process, water treatment for sanitary  
150 and cooling purposes, decontamination of equipment removed from the plant for maintenance  
151 or replacement, recovery of uranium from various waste materials and treatment of sewage  
152 wastes and cooling water blow down. The construction, operation and maintenance of this  
153 facility requires the use of a wide range of commercially available chemicals. Continuous  
154 operation of this facility since 1954 has resulted in the generation of inorganic, organic and  
155 low level radioactive waste materials.

156 In 1989, U.S. DOE and the State of Ohio entered into a Consent Decree that outlined the  
157 requirements for handling hazardous waste generated at the PORTS facility and for conducting  
158 investigation and corrective measures studies at the site. U.S. EPA and U.S. DOE entered  
159 into a similar agreement, the AOC, in September 1989. This agreement was negotiated  
160 between U.S. EPA Region V and U.S. DOE. The AOC requires that the PORTS facility  
161 conduct a RCRA Facility Investigation (RFI) and a Corrective Measures Study (CMS), select  
162 remedies, and implement them according to a Corrective Measures Implementation (CMI)  
163 plan. A schedule is attached to each agreement outlining a submittal dates to Ohio EPA and  
164 U.S. EPA for documents pertaining to the investigation and corrective measures studies. A  
165 schedule regarding submittal dates for submittal of project deliverables was attached to the  
166 Director's Findings and Orders regarding integration of certain hazardous waste management  
167 units into the ongoing clean-up process as agreed to by US DOE and Ohio EPA in January  
168 1999.

169 The AOC and Consent Decree require corrective action based on the requirements of RCRA.  
170 In addition, the AOC states that CERCLA requirements must be incorporated into the  
171 corrective action process. In areas where the AOC and Consent Decree are not specific,

172 regulations and guidance under RCRA statutes are used. In specific instances where RCRA  
173 provides no guidance, the provisions of CERCLA are used, as appropriate.

## 174 2.1 HISTORY OF QUADRANT IV AND THE X-734 LANDFILL AREA

175 The Quadrant IV RFI was conducted in two phases. Phase I of the investigation was  
176 conducted from February to August 1991. Phase II of the investigation was conducted from  
177 October to December 1993. The draft final version of the RFI report was submitted on  
178 December 10, 1996. The Q IV RFI received final approval from Ohio EPA on September 5,  
179 1997. Twenty-seven SWMUs were investigated during Phases I and II of the Quadrant IV  
180 RFI. The investigation included analysis of soil, sediment, surface water and groundwater  
181 where appropriate. Ecological data was collected during the RFI to help support the *Baseline*  
182 *Ecological Risk Assessment* (BERA) approved by Ohio EPA on February 7, 1997. Additional  
183 data was collected for the Air RFI which was approved by Ohio EPA on August 28, 1998.  
184 The Quadrant IV CAS/CMS Report was submitted to the Ohio EPA for review August 21,  
185 1998. Ohio EPA approved of the CAS/CMS Report October 19, 1998.

## 186 3.0 RISK ASSESSMENT

187 The assessment of potential or current risks from wastes present at the site is based on  
188 guidance provided by the US EPA, in particular the "Risk Assessment Guidance for  
189 Superfund (RAGS), (US EPA, 1989a) and Guidelines for Exposure Assessment (US EPA,  
190 1992a). These guidance documents are founded on well - established chemical risk assessment  
191 principles developed for the regulation of environmental contaminants.

192 The risk assessment for contaminated sites on the DOE-PORTS site consists of a Human  
193 Health Risk Assessment and an Ecological Risk Assessment. The Ecological Risk Assessment

was conducted separately. The Human Health Risk Assessment is conducted assuming that no institutional controls such as fencing are in place and that the area within the Perimeter road will remain industrial in the future and the use of the site outside of Perimeter road will be either commercial or recreational in the future. Groundwater is assumed to be used for drinking and bathing purposes both inside and outside of the Perimeter road. The industrial use scenario is considered to be the most likely future use at the US DOE site. The initial risk assessment conducted for the site assumes that no future cleanup action is taken and is referred to as the Baseline Risk Assessment. The Baseline Risk Assessment consists of numerous steps as follows:

### **3.1 Identification of Chemicals of Concern**

After data collected during the RFI was evaluated, those chemicals that were detected during lab analysis were retained as **Chemicals of Concern (COC)**. Some data not appropriate for certain exposure pathways was excluded. For example, deep soil data greater than 10 feet would not be expected to be available for possible ingestion by children or adults and is only a threat to ground water contamination. Therefore, this data was not included in the assessment of soil ingestion risks.

### **3.2 Exposure Assessment**

This step involves the evaluation of potential human exposures to site chemicals. There are basically four separate tasks necessary in the Exposure Assessment. These steps are: (a) **The Characterization of the Exposure Setting**; (b) **Identification of Exposure Pathways**; (c) **Estimation of Environmental Concentrations**; and (d) **Estimation of Human Intake**.

#### **3.2.1 Characterization of the Exposure Setting**

This step involves modeling or simulating those exposure scenarios considered possible on the

site both for current use and future use. The following scenarios were included in the baseline risk assessment:

#### 3.2.1.1 Current Use Scenarios

- on-site worker
- off-site resident
- off-site recreational population

The on-site worker scenario describes potential exposures to outdoor media at PORTS for a worker engaged in normal day-to-day activities throughout the quadrant. The recreational population scenario was developed to assess potential exposures to surface water bodies on the PORTS reservation and to fish and game eaten by local recreational anglers and hunters. In estimating exposure for both current off-site resident and recreational populations, any significant direct access to media within the Quadrant being evaluated was considered unlikely. Exposures were assumed to result from contaminants that could potentially migrate off-site.

As stated above, future use scenarios were developed consistent with the reasonable maximum exposure. The area within the Perimeter road is expected to remain industrial in the future. Areas outside the Perimeter road within the reservation were evaluated for a future recreational/commercial use. For the future use conditions, the following scenarios were developed:

#### 3.2.1.2 Future Use Scenarios

- On-site commercial use \*(developed after the approval of the RFD)
- On-site recreational population
- On-site industrial worker

- 242                   •     Off-site resident
- 243                   •     Off-site recreational population.

244     \*(the RFI included the analysis of risk for an on site future resident. After careful review of potential future uses for the site the Ohio and US  
245     EPA determined that it was unlikely that the site would be developed for use as residential property. More than likely (especially those areas  
246     within the security fence) the site will be redeveloped for industrial/commercial purposes.)

247     In addition to the on-site worker who is involved in normal day-to-day activities, another  
248     exposure scenario modeled under both current and future land use conditions is the excavation  
249     worker. This worker is assumed to be in contact with contaminated media during periodic,  
250     intrusive activities such as construction or landscaping. The future worker scenario described  
251     potential exposures to outdoor media at PORTS and includes the ingestion of groundwater.

### 252     3.2.2   Identification of Human Exposure Pathways

253     The above exposure scenarios were developed to model or simulate possible exposure  
254     situations found at the site. It is also necessary to determine the most likely exposure  
255     pathways as well. An example of an exposure pathway is the ingestion of contaminated  
256     groundwater by on-site workers in the future. The following exposure pathways were  
257     evaluated for both the current and future worker as well as the recreational visitor:

- 258                   •     Exposure to Groundwater via ingestion of drinking water, and  
259                         dermal contact and inhalation of volatiles while showering; (for  
260                         future on-site worker only)
- 261                   •     Exposure to soil via incidental ingestion and dermal contact, and via  
262                         external gamma radiation from radionuclides present in soil;
- 263                   •     Exposure to sediment via incidental ingestion and dermal contact;



- Exposure to surface water via incidental ingestion and dermal contact;
- Exposure to air via inhalation of vapors and particulates;
- Exposure via ingestion of local game contaminated by grazing on land affected by plant operations;
- Exposure via ingestion of fish.

### 3.2.3 Estimation of Environmental Concentrations

In this step, concentrations of chemicals and radionuclides in various environmental media from which exposure may occur are estimated via sampling results and mathematical modeling.

### 3.2.4 Estimation of Human Intake

This step involves calculating the amount of a substance received by an individual through exposure to chemicals and radionuclides in the various environmental media. Chemical intakes (referred to as **chronic daily intakes or CDIs**) are typically expressed in terms of the amount of material in contact with the body for a certain time period, and are calculated as a function of chemical concentration in the soil or water, how often the exposure occurs and how long (exposure frequency), body weight, and the portion of a lifetime that exposure occurs. The generic equation for calculating the **CDI** is as follows:

$$CDI = \frac{C \times CR \times EF \times ED}{BW \times AT}$$

where:

285                    **CDI**    =    Chronic daily intake, mg/kg/day  
 286                    **C**        =    Chemical concentration in soil or water, e.g. mg/kg soil  
 287                    **CR**       =    Contact Rate, e.g., kg/soil/day  
 288                    **EF**       =    Exposure frequency, days/year  
 289                    **ED**       =    Exposure Duration, years  
 290                    **BW**       =    Body Weight, kg  
 291                    **AT**       =    Averaging Time; portion of lifetime over which exposure  
 292                                    is averaged (days).

293    Variations of this equation are used when calculating air inhalation and radiological exposures.  
 294

### 295    3.3    Toxicological Assessment

296    The toxicological assessment involves the identification of adverse health effects associated  
 297    with exposure to a chemical or radionuclide and the relationship between the extent of  
 298    exposure and the likelihood and/or severity of adverse effects. The U.S. EPA has conducted  
 299    such assessments on many frequently occurring environmental chemicals and radionuclides and  
 300    has developed toxicity values based on these assessments for use in risk assessments. Further  
 301    information regarding the toxicological assessment can be found in the RFI Reports.

### 302    3.4    Risk Characterization

303    This step involves calculating estimates of carcinogenic (cancer causing) and non-carcinogenic  
 304    risks from chemicals of concern for different exposure pathways. Cancer risk is defined as the  
 305    probability of an individual developing cancer over a lifetime as a result of exposure to a  
 306    potential carcinogen in addition to the probability of cancer risks from all other causes. As a  
 307    benchmark in developing clean-up goals at contaminated sites, an acceptable range of excess  
 308    cancer risk (ECR) from one in one million ( $1 \times 10^{-6}$ ) to one in ten thousand ( $1 \times 10^{-4}$ ) has been  
 309    established. The point of departure or program goal for risk remaining after a site is cleaned

up is  $1 \times 10^{-6}$  (i.e. a one in one million excess lifetime cancer risk, above and beyond risks from other unrelated causes) and is the risk goal for the U. S. DOE-PORTS site.

The "Hazard Quotient" (HQ) is used to determine the severity of non-cancerous hazards posed at a site. The HQ is determined by dividing the Chronic Daily Intake (CDI) by the Reference dose (RfD). The reference dose is the amount of material that is determined to cause a toxic effect. If the HQ is less than or equal to 1, then the estimated exposure to a substance represented by the CDI, is judged to be below the threshold that could result in a toxic effect. An HQ greater than 1, indicates that a toxic effect may result. To assess the cumulative effect of similar noncancerous substances, the HQ for all of the substances being assessed at a site are added, with the result being the Hazard Index (HI).

### 3.5 Conclusions

The risks estimated for substances evaluated at a SWMU and in the quadrant, are compared to target risk levels and general conclusions are made regarding the potential risks associated with these substances.

**TABLE I**  
*Soil Clean-up objectives for on-site worker and excavation worker, at X-734*

Contaminants of Concern	Selected Soil PRG (mg/kg)	Basis
Arsenic	31	BG
Barium	181	BG
Beryllium	1.4	BG
Chromium	52.7	Excavation CR
Lithium	35	BG
Manganese	2012	BG
Nickel	34	BG
Uranium	7.4	On-Site Worker CR
BG = Background		CR = Cancer Risk

336 ***Gallia Groundwater Clean-up objectives for on-site worker at X-734***

337	<u>Contaminants of Concern</u>	<u>Selected Gallia PRG (ug/L)</u>	<u>Basis</u>
338	Antimony	36.5	BG
339	Arsenic	92	BG
340	Beryllium	6.5	BG
341	Chromium	100	MCL
342	Lead	16	BG
343	Nickel	100	MCL
344	cis-1,2-Dichloroethene	70	MCL
345	Trichloroethene	5	MCL
346	Vinyl Chloride	2	MCL

347 BG = Background

348 MCL = Maximum Concentration Limit per the Safe Drinking Water Act

349 ***Berea Groundwater Clean-up Objectives for on-site worker, at X-734***

350	<u>Contaminants of Concern</u>	<u>Selected Berea PRG (ug/L)</u>	<u>Basis</u>
351	<u>Lead</u>	<u>10</u>	<u>BG</u>

352 BG = Background

353 ***Seep Water Clean-up Objectives for on-site worker and recreation, at X-734***

354	<u>Contaminants of Concern</u>	<u>Selected Seep Water PRG (ug/L)</u>	<u>Basis</u>
355	<u>Arsenic</u>	<u>3.59</u>	<u>On-Site Worker CR</u>
356	<u>Cadmium</u>	<u>8.5</u>	<u>Ohio WQS</u>
357	<u>Zinc</u>	<u>32</u>	<u>Ohio WQS</u>

358 CR = Cancer Risk

359 Ohio WQS = State of Ohio Water Quality Standard

360 **4.0 DISCUSSION OF THE X-734, X-734A AND X-734B SWMU IN Q IV**

361 The X-734 Area (X-734 Old Sanitary Landfill, X-734A Construction Spoils Landfill,  
362 X-734B Construction Spoils Landfill)

The X-734 Old Sanitary Landfill has a total of approximately 3.8 acres. Detailed records of materials disposed in the landfill were not kept. However, waste known to be disposed of at X-734 include: trash and garbage, construction spoils, and waste containing unspecified levels of heavy metals. While not substantiated, plant personnel have indicated that organic solvents may have been disposed of in the unit.

The X-734A Construction Spoils Landfill has a total area of approximately 3.5 acres and is adjacent to the southern boundary of X-734. Waste disposed of at X-734A included construction spoils, trees, railroad ties, broken concrete, stumps, roots, brush, and other wastes from clearing and grubbing operations. A surface water seep area is located in the upper portion of the slope on the eastern side of the landfill.

The X-734B Construction Spoils Landfill is located south of the X-734A and has a surface area of approximately 4.6 acres. A road and buffer zone separate the northern boundary of X-734B from X-734A. X-734B reportedly received the same type of waste as X-734A. The southwest boundary of this unit overlaps a portion of the X-744W leach field area.

### Risk Analysis

Environmental media sampled at this unit during the RFI were surface water, sediment, surface soil (0 to 2 ft), shallow soil (2 to 10 ft), deep soil, and groundwater.

**Seep Surface Water and Sediment.** The Quadrant IV RFI BRA identified a total noncancer HI of 2 for the current on-site worker and on-site recreational population scenarios. These risks are driven by exposure to arsenic in the seep sediment associated with this SWMU. The BRA also identified a total ELCR of  $4 \times 10^{-4}$  for the current on-site worker scenario because of the presence of arsenic and PAHs in seep leachate associated with this SWMU. A total ELCR of  $8 \times 10^{-4}$  identified for the on-site recreational population scenario is driven by exposure to arsenic, beryllium, and PAHs in the seep sediment and arsenic in the surface water.

387 **Soil and Groundwater.** The Quadrant IV RFI BRA identified a total noncancer HI of less  
388 than 1 for the current on-site worker. The BRA identified a total noncancer HI of 7 for the  
389 future on-site worker scenario. This risk is driven by exposure to arsenic in the groundwater  
390 associated with this SWMU. The BRA also identified a total noncancer HI of 1 for the  
391 excavation worker scenario. This risk is driven by exposure to inorganic constituents in the  
392 soil associated with this SWMU.

393 The BRA also identified a total ELCR of  $1 \times 10^{-4}$  for the current on-site worker scenario because  
394 of the presence of arsenic, beryllium, and PAHs in the soil associated with this SWMU. A  
395 total ELCR of  $1 \times 10^{-3}$  was identified for the future on-site worker scenario. This risk is driven  
396 by exposure to arsenic, beryllium, and PAHs in the soil and arsenic and beryllium in the  
397 groundwater associated with this SWMU. A total ELCR of  $8 \times 10^{-6}$  was identified for the  
398 excavation worker scenario. This risk is driven by exposure to arsenic and PAHs in the soil.

## 399 **5.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION**

400 The Ohio EPA relies on the public to ensure that each remedial alternative selected at PORTS  
401 meets the needs of the local community, in addition to being an effective solution to the  
402 problem.

403 The Quadrant IV Preferred Plan was released to the public in May 1999. This document is  
404 available to the public in the administrative record, maintained at the Environmental  
405 Information Center, P.O. Box 693, Piketon Ohio and at the Ohio EPA Southeast District  
406 Office, 2195 Front Street, Logan, Ohio. Notice of the availability of the Preferred Plan was  
407 published in the Pike County News Watchman and Pike County Advertiser on May 30, 1999.

408 The remedial action selected for groundwater at X-734 fits into the overall clean-up strategy  
409 for the PORTS facility by reducing mobility, and eliminating the exposure pathways that may

410 present a current or future risk to human or ecological receptors. The selected remedy also  
411 addresses the potential for contaminant release and off-site migration.

412 Ohio EPA formally presented the Preferred Plan for Quadrant IV at a public availability  
413 session held on June 3, 1999. At this meeting representatives from Ohio EPA discussed the  
414 RFI, CAS/CMS, and the Preferred Plan, and answered questions and received comments  
415 related to Quadrant IV and the remedial alternatives under consideration. Responses to  
416 significant comments, criticisms, or new data received during the comment period and public  
417 meeting are included in the "Responsiveness Summary," which is attached to this Decision  
418 Document.

419 This decision document presents the selected remedial actions for X-734, X-734A and X-734B  
420 in Quadrant IV of the US DOE Portsmouth Facility. These actions are chosen in accordance  
421 with the resource Conservation and recovery Act (RCRA) of 1976, the Comprehensive  
422 Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended  
423 by the Superfund Amendments and Reauthorization ACT (SARA) of 1986, and to the extent  
424 practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP),  
425 and the Hazardous and Solid Waste Amendments (HWSA) of 1984. This decision is based on  
426 the administrative record for this response action.

427 All Documents leading up the Preferred Plan have been available for public review and  
428 comment prior to selection of the chosen remedies. Documents issued before the Preferred  
429 Plan include, but are not limited to the Quadrant IV Final RFI Report (DOE 1996), The  
430 Baseline Ecological Risk Assessment (DOE 1994), The Air RFI (DOE 1997), the Background  
431 Sampling Investigation (DOE 1996), the Quadrant III CAS/CMS Report (DOE 1998).

## 432 6.0 SCOPE AND ROLE OF THE RESPONSE ACTION

433 The PORTS facility has been separated into quadrants that roughly correspond to groundwater

flow paths within the uppermost water-bearing unit beneath the site (the Gallia formation). Each quadrant contains multiple SWMUs and a diverse range of environmental media (i.e., soil, sediment, groundwater, etc.). Media within the SWMUs have been analyzed to determine if contaminants are present at concentrations that may present a threat to human health or the environment.

The scope of remedial actions implemented at the PORTS facility is to eliminate or reduce (to acceptable levels) any risks to human health or the environment posed by releases and/or potential releases of contaminants from the SWMUs at ports. SWMUs at the PORTS facility are in various stages of the remedial action process; however, remedial actions performed at the SWMUs are coordinated to achieve overall risk reduction and complete remediation of the entire facility. It is also desirable that remedial actions implemented restore and enhance the areas being remediated.

The X-734 Area (X-734 Old Sanitary Landfill, X-734A Construction Spoils Landfill, X-734B Construction Spoils Landfill) require remedial action at this time. The principle threat identified at the X-734 area is from the uncapped units and potential future use and ingestion of groundwater contaminated with volatile organic and inorganic contaminants. The remedial action selected for the X-734 SWMU fits into the overall clean-up strategy for the PORTS facility by eliminating the exposure pathways that may lead to present and future risk to human and ecological receptors.

## 7.0 SUMMARY OF QUADRANT CHARACTERISTICS

Several investigative studies were conducted to determine the nature and extent of contamination within the Quadrant. The investigation is detailed in the final Q IV RFI and Q IV CAS/CMS Report. The following were investigated as part of the Q IV Investigation:

◆ Soil



- 459       ◆     Groundwater
- 460       ◆     Surface Water &
- 461       ◆     Sediments.

## 462     7.1 POTENTIAL SOURCES OF CONTAMINATION

463     The X-734 Landfill area requires active remedial measures to prevent potential exposure to  
464     contaminants (*Figure 6.1*). The Quadrant IV risk assessment identified organic and inorganic  
465     contaminants in groundwater, soils and sediments contaminants of concern. The COCs for soil  
466     include arsenic, barium, beryllium, chromium, lithium, manganese, nickel, and uranium. The  
467     COCs for Gallia groundwater include antimony, arsenic, beryllium, chromium, lead, nickel,  
468     cis-1,2-dichloroethene, trichloroethene, and vinyl chloride. The only COC for Berea  
469     groundwater is lead. The COCs for seep water include arsenic, cadmium, and zinc.

## 470     8.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

471     The CAS/CMS was conducted to identify and screen technologies and clean-up alternatives to  
472     address the COCs in Q IV.

### 473     8.1 *Development of Alternatives for X-734 SWMU - CAS/CMS Study*

474     The CAS/CMS was conducted to screen technologies for the remediation of units in Quadrant  
475     IV. The X-734 Area required the development and evaluation of cleanup alternatives. The  
476     alternatives were developed to evaluate remedies for the contaminated media in the X-734  
477     Area. Four alternatives were evaluated (1, 2, 3a, 3b and 4) and are described in detail below:

478 **ALTERNATIVE 1- NO ACTION**

479 The No Action alternative provides a basis for comparison with other alternatives. Under the  
480 No Action alternative, no treatment, containment, removal, or monitoring of the environmental  
481 media in the X-734 Area would be performed. Unrestricted access to PORTS in its current  
482 condition would be allowed, and no present or future restrictions on access or land use would  
483 be implemented.

484 **COST ANALYSIS: ALTERNATIVE #1 - NO ACTION**

485 There are no costs associated with this alternative.

486 **ALTERNATIVE 2- INSTITUTIONAL CONTROLS**

487 Institutional Controls for the X-734 Area would include deed restriction, fencing, groundwater  
488 monitoring, surface water drainage control, and surface water monitoring to prevent contact  
489 with the soil, waste, and debris. The landfill contents would remain in place and would not be  
490 treated or removed.

491 Deed restrictions would limit future land use and prevent inappropriate development on the  
492 affected SWMUs. A fence would be placed around the perimeter of the SWMUs to prevent  
493 unauthorized entry. Surface water drainage control would be implemented to limit erosion and  
494 to prevent potentially contaminated landfill seeps from affecting environmental media. Surface  
495 water drainage control would include vegetation of landfill surfaces and the installation of  
496 perimeter ditches for drainage control, as needed. Groundwater monitoring would be  
497 conducted to verify that contaminants are not migrating from the landfills at unacceptable  
498 levels. Existing monitoring wells upgradient and downgradient from the landfills would be  
499 sampled. The specific wells, parameters, and sampling frequencies would be determined as  
500 part of the CMI. Surface water monitoring is currently being conducted in Little Beaver Creek

and the North Drainage Ditch and will continue under this alternative. The existing pipe culvert that extends through the X-734A Landfill would be abandoned in place. Alternative 2 could be implemented in 9-11 months.

#### **COST ANALYSIS: ALTERNATIVE #2 - INSTITUTIONAL CONTROLS**

Present Worth Capital Cost: \$ 448,000

Present Worth O&M Cost: \$ 633,000

Total Present Worth Cost: \$1,081,000

#### ***ALTERNATIVE 3a - INSTITUTIONAL CONTROLS AND CONTAINMENT (MULTIMEDIA CAP)***

Alternative 3a consists of the following:

- 1) Institutional Controls: deed and access restrictions, groundwater monitoring, and surface water monitoring; and
- 2) Containment: capping of X-734/X-734A and X-734B with multimedia caps.

Alternative 3a (*Figure 6.6*) has been designed to contain the soil, waste, and debris in the landfills. It would not treat or remove any material from the SWMUs. Soil, waste, and debris would be contained under a multimedia cap to prevent exposure and direct contact with the material, prevent surface-water infiltration, and reduce the potential for contaminant migration from the landfills.

Institutional controls for Alternative 3a would include deed restrictions and fencing. Deed restrictions would prevent inappropriate development on the landfills and alterations that could compromise cover system integrity. Fencing would be placed around the units to restrict access. Groundwater monitoring would be conducted to verify that contaminants are not

524 migrating from the landfills at unacceptable levels. Existing monitoring wells upgradient and  
525 downgradient from the landfills would be sampled. The need for modifications to existing  
526 wells or installation of new wells would be determined as part of the CMI. The specific wells,  
527 parameters, and sampling frequencies would also be determined as part of the CMI. Surface  
528 water monitoring is currently being conducted in Little Beaver Creek and the North Drainage  
529 Ditch and would continue under this alternative.

530 Containment for the X-734 Area would consist of covering the surface areas of X-734, X-  
531 734A, and X-734B with a multimedia cap. This cap would be an engineered cap that meets  
532 RCRA Subtitles C and D and Ohio Hazardous Waste and Solid Waste requirements. For cost  
533 estimate purposes, a cap meeting Ohio Solid Waste construction specifications was used;  
534 however, the final cap specifications would be determined as part of the CMI.

535 The caps proposed for X-734/X-734A and X-734B would cover surface areas of approximately  
536 7.3 and 4.6 acres, respectively. The layers from bottom to top would include a compacted soil  
537 subgrade, a geosynthetic clay liner (GCL), a flexible membrane liner (FML), a drainage layer,  
538 a frost protection layer, and a vegetative layer to prevent erosion. To construct the caps,  
539 initial grading and placement of compacted soil fill material to attain proper grade for drainage  
540 would be required. Before constructing the cap at X-734A, the existing pipe culvert that  
541 extends through X-734A would be abandoned in place and buried. After proper grading is  
542 attained, the multimedia caps would be installed.

543 Special consideration would need to be given to the highly sloped area on the northeastern side  
544 of X-734 and X-734A to address any potential stability concerns. For cost estimation  
545 purposes, a slope treatment consisting of FML, geonet, and grouted riprap is considered in this  
546 alternative. The FML and geonet would be anchored into the top and bottom of the slope, and  
547 riprap would be hand placed following installation of the geomembrane and geonet. Grout  
548 would be sprayed on the riprap for additional stabilization. Other possible slope treatment  
549 methods are to install a rock counter berm or to relocate the North Drainage Ditch and extend

550 the toe of the slope to create a flatter slope. However, the stability of the slope and the final  
551 slope treatment method would be addressed in the CMI.

552 A perimeter ditch would be constructed around the capped areas to control surface drainage.  
553 Routine maintenance would be required for the capped areas to ensure long-term effectiveness.  
554 Maintenance activities would include periodic inspections, vegetative upkeep and mowing, and  
555 as needed repair of capped surfaces. Alternative 3a could be implemented in 17-19 months.

556 **COST ANALYSIS: ALTERNATIVE 3a - INSTITUTIONAL CONTROLS**  
557 **AND CONTAINMENT (MULTIMEDIA CAP)**

558 Present Worth Capital Cost: \$6,467,000  
559 Present Worth O&M Cost: \$ 918,000  
560 Total Present Worth Cost: \$7,385,000

561 ***ALTERNATIVE 3b- INSTITUTIONAL CONTROLS AND CONTAINMENT***  
562 ***(MULTIMEDIA CAP AND COLLECTION TRENCH)***

563 Alternative 3b is comprised of the following:

- 564 1) Institutional Controls: deed and access restrictions, groundwater monitoring,  
565 and surface water monitoring; and  
566 2) Containment: capping of X-734/X-734A and X-734B with a multimedia cap in  
567 conjunction with installation of a seep water/groundwater collection trench.

568 Alternative 3b (*Figures 6.7 and 6.8*) has been designed to contain the soil, waste, and debris in  
569 the landfills. The alternative would not treat or remove any material from the SWMUs. Soil,  
570 waste, and debris would be contained under a multimedia cap to prevent exposure and direct

571 contact with the material, prevent surface water infiltration, and reduce the potential for  
572 contaminant migration from the landfills.

573 Institutional controls for Alternative 3b would include deed restrictions and fencing. Deed  
574 restrictions would prevent inappropriate development on the landfills and alterations that could  
575 compromise cover system integrity. Fencing would be placed around the capped areas to  
576 restrict access. Surface water and groundwater monitoring will be conducted as described for  
577 Alternative 3a.

578 Containment for the X-734 Area would consist of an engineered cap that meets RCRA  
579 Subtitles C and D and Ohio Hazardous Waste and Solid Waste requirements, as described for  
580 Alternative 3a. As with Alternative 3a, the existing pipe culvert that extends through X-734A  
581 would be abandoned in place and buried before constructing the cap at X-734A.

582 A seep water/groundwater collection trench would be constructed at the toe of the slopes on  
583 the eastern and northeastern sides of X-734 and X-734A (Figure 6.7). The collection trench  
584 would extend to bedrock and consist of a perforated PVC pipe placed in a pea gravel-filled  
585 trench. The bottom and downgradient side of the trench (toward the stream) can be lined with  
586 FML to reduce infiltration of water from the stream. In the northeastern area to be covered  
587 with geosynthetics and riprap, the synthetic geomembrane and geonet would extend over the  
588 trench to divert surface runoff away from the collection trench (Figure 6.8).

589 The trench would collect seep water/groundwater and pump it to an on-site groundwater  
590 treatment system. Treatability studies, performed on seep water/groundwater samples prior to  
591 trench construction, would determine the appropriate treatment for collected leachate.

592 After construction of the caps and trench system, a perimeter ditch would be constructed  
593 around the capped areas to control surface water runoff. Routine maintenance would be  
594 required for the capped areas to ensure long-term effectiveness. Maintenance would include

periodic inspections, vegetative upkeep and mowing, and as needed repair of the capped surface. An annual performance review of the cap would be required. Alternative 3b could be implemented in 21-23 months. Maintenance of the collection trench and groundwater treatment system would also be required.

**COST ANALYSIS: ALTERNATIVE 3b - INSTITUTIONAL CONTROLS AND CONTAINMENT (MULTIMEDIA CAP AND COLLECTION TRENCH)**

Present Worth Capital Cost: \$ 6,933,000

Present Worth O&M Cost: \$ 6,787,000

Total Present Worth Cost: \$13,720,000

**ALTERNATIVE 4 - INSTITUTIONAL CONTROLS AND CONTAINMENT (MULTIMEDIA CAP AT X-734/X-734A, SOIL CAP AT X-734B, AND PHYTORMEDIATION)**

Alternative 4 is comprised of the following:

Institutional Controls: deed and access restrictions, groundwater monitoring, and surface water monitoring; and

Containment: capping of X-734/X-734A with a multimedia cap and X-734B with a soil cap, and phytoremediation

Alternative 4 (*Figure 6.9*) has been designed to contain the soil, waste, and debris of the landfills. The alternative would not treat or remove any waste from the landfills; however, contaminated groundwater may be removed and treated by phytoremediation if contaminants migrate from beneath the X-734B landfill. Soil, waste, and debris would be contained under a multimedia cap or soil cap to prevent potential for contaminant migration from the landfills. Phytoremediation (trees) would also

617 be used downgradient of X-734B to capture and remediate any groundwater that could potentially  
618 migrate from beneath the landfill. (See Figure 6.10 in Appendix II)

619 Institutional controls for Alternative 4 would be similar to those described in Alternatives 3a and 3b.  
620 Surface and groundwater monitoring will be conducted as described for Alternative 3a.

621 Containment for the X-734 Area would consist of covering the surface areas of X-734 and X-734A  
622 with a multimedia cap and X-734B with a soil cap, and phytoremediation downgradient of X-734B.  
623 The multimedia cap at X-734/X-734A would be an engineered cap that meets RCRA subtitles C and  
624 D and Ohio Hazardous Waste and Solid Waste requirements, as described for Alternative 3a. The  
625 soil cap at X-734B would be an engineered cap that meets Ohio Construction and Demolition Debris  
626 (C&D) requirements. (See Figure 6.9 in Appendix II.)

627 The caps proposed for X-734/X-734A and X-734B would cover surface areas of approximately 7.3  
628 and 4.6 acres, respectively. The layers in the soil cap at X-734B would consist of a compacted  
629 cohesive soil layer and a vegetative layer to prevent erosion. (See Figures 6.2 and 6.3 in Appendix  
630 II). To construct the caps, initial grading and placement of compacted soil fill material to attain  
631 proper grade for drainage may be required. Prior to construction of the soil cap, three existing  
632 monitoring wells within the limits of waste at X-734B (X734-08B, X734-09G, and X734-12G) will  
633 be plugged and abandoned and three new monitoring wells will be installed outside the limits of  
634 wastes. In addition, two existing monitoring wells outside the limits of waste at the X-734B (X734-  
635 10G and X734-11G) are close to the projected cap area and may need to be abandoned and replaced  
636 by new wells if they are within the area of the soil cap installation.

637 Phytoremediation is proposed in two areas east of X-734B to capture and remove any contaminants  
638 that may leach from the landfill into groundwater and migrate toward the North Drainage Ditch  
639 (NDD). Phytoremediation is an in situ technology that relies on the natural growth process of  
640 vegetation to remediate a contaminated site. The phytoremediation process involves direct uptake of  
641 some contaminants (in this case trees), release of compounds that stimulate bacterial growth and



introduction of additional carbon sources for beneficial fungi growth. The trees planted in this area could be capable of pumping 50gal/day/tree of groundwater. (Please refer to page 6-45 of the Quadrant IV CAS/CMS report for a full explanation of how the trees will remediate contaminated groundwater.)

Downgradient of X-734B, hybrid poplar trees such as *Populus trichocarpa* x *Populus deltoides* would be planted approximately ten feet apart and at least 20 feet away from existing overhead power lines. The roots of the trees should be able to reach the shallow groundwater surface in that area. The trees should act as an effective barrier to intercept contaminants that may leach from the buried waste into the groundwater.

After construction of the caps, a perimeter ditch would be constructed around the capped areas to control surface water runoff. Routine maintenance would be required for the capped areas to ensure long-term effectiveness. Alternative 4 could be implemented in 17-19 months.

#### COST ANALYSIS:

Present worth Capital Costs: \$ 5,884,000

Present worth O & M Costs: \$ 946,000

\$ 6,830,000

## **9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**

In selecting the remedial alternative, the Ohio EPA will consider the following eight criteria.

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection, and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, and/or institutional controls.

- 663 2. Compliance with all State, Federal and local laws and regulations addresses  
664 whether or not a remedy will meet all of the applicable State, Federal, and Local  
665 environmental statutes.
- 666 3. Long-term effectiveness and permanence refers to the ability of a remedy to  
667 maintain reliable protection of human health and the environment over time once  
668 clean-up goals have been met.
- 669 4. Reduction of toxicity, mobility, or volume through treatment is the anticipated  
670 performance of the treatment technologies to yield a permanent solution. This  
671 includes the ability of the selected alternative to reduce the toxic characteristics of the  
672 chemicals of concern or remove the quantities of those chemicals to an acceptable risk  
673 concentration or regulatory limit and/or decrease the ability of the contaminants to  
674 migrate through the environment.
- 675 5. Short-term effectiveness involves the period of time needed to achieve protection and  
676 any adverse impacts on human health and the environment that may be posed during  
677 the construction and implementation period until clean-up goals are achieved.
- 678 6. Implementability is the technical and administrative feasibility of a remedy, including  
679 the availability of goods and services needed to implement the chosen solution.
- 680 7. Cost includes capital and operation and maintenance costs.
- 681 8. Community acceptance is addressed as the Responsiveness Summary in Appendix II.

683 Selection of a remedy: Remedies selected reflect the scope and the purpose of the actions being  
684 undertaken and how the action relates to long term comprehensive response at the site. The criteria  
685 noted above are categorized into three groups. (A) Threshold Criteria- Overall protection of human

health and the environment and compliance with ARARs (unless a specific ARAR is waived) are threshold requirements that each alternative must meet. (B) Primary balancing criteria- the five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost. (C) Modifying Criteria-Community acceptance is considered modifying criteria. Ohio EPA evaluated each alternative using the above eight criteria. The following discussion summarizes the compliance of the alternatives with these criteria.

1. Overall Protection of Human Health and the Environment

Alternative 1 for the X-734 area would not meet any of the RAOs for groundwater, soil, sediment, or surface water. Exposure to contaminants and the potential for contaminant migration would remain. Therefore, this alternative would not be protective of human health and the environment. Alternative 2 would prevent exposure of on-site personnel and recreational visitors to contaminants in some media; however, long-term exposure risks associated with Alternative 2 would be unacceptable because the alternative would only partially satisfy the RAOs for groundwater, soil, sediment, or surface water.

Alternatives 3a, 3b and 4 would meet all RAOs for groundwater, soil, sediment, and surface water. All groundwater RAOs would be met by preventing the infiltration of contaminants to groundwater and thereby preventing migration and exposure to COCs above PRGs. All soil RAOs would be satisfied by preventing exposure pathways to COCs in soil above PRGs and preventing leaching of COCs from soil to groundwater. All sediment RAOs would be met by preventing exposure to COCs in sediment above PRGs. All surface water RAOs would be met by preventing COCs from entering surface water and preventing surface water exposure pathways to receptors.

Alternatives 3a, 3b and 4 would not significantly impact ecological receptors and habitat during construction because the landfills are in previously developed areas and are not pristine habitat.

710 These alternatives would provide greater long-term protection than alternatives 1 and 2 because they  
711 would reduce migration of and surface exposure to contaminants.

712 Alternatives 4 and 3b would provide additional containment by providing a mechanism for collecting  
713 seep water/groundwater and prohibiting it from entering Little Beaver Creek.

714 2. **Compliance with all State, Federal and Local Laws and Regulations**

715 Selected remedial actions on the U. S. DOE site must comply with applicable Federal, State, and  
716 Local laws and regulations. Examples of these include, but are not limited to, the Clean Air Act,  
717 Toxic Substances Control Act, the Safe Drinking Water Act, the Clean Water Act, the Resource  
718 Conservation and Recovery Act, Ohio Revised Code (ORC) 6111, ORC 3734, and Ohio  
719 Administrative Code 3745. The Comprehensive Environmental Response, Compensation, and  
720 Liability Act (CERCLA) requires that remedial actions meet legally applicable or relevant and  
721 appropriate requirements (ARARs) of other environmental laws. "Applicable requirements" means  
722 those cleanup standards of control, and other substantive environmental protection requirements,  
723 criteria, or limitations promulgated under Federal or State law that specifically address a hazardous  
724 substance, pollutant, contaminant, remedial action, location, or other circumstance at a site.  
725 "Relevant and appropriate" requirements are cleanup standards, standards of control, and other  
726 substantive environmental protection requirements, criteria or limitations promulgated under Federal  
727 or State law that, while not legally "applicable" to a hazardous substance, pollutant, remedial action  
728 or circumstance at a site, their use and application is well suited to the situation at a site. An example  
729 of a situation where a law would be relevant and appropriate is the treatment of waste not lawfully  
730 deemed "hazardous" but identical to chemicals currently deemed hazardous under the Resource  
731 Conservation and Recovery Act (RCRA). A list of Ohio's ARARs for the X-734 Area SWMUs is  
732 provided in Appendix I.

733 ARARs are divided into three different categories:

- 734 • Chemical-Specific ARARs
- 735 • Action-Specific ARARs
- 736 • Location-Specific ARARs

737 Chemical-Specific ARARs are health or risk-based numerical values which establish the acceptable  
738 amount of concentration of a chemical that may be found in the environment. An example of  
739 chemical-specific requirements are maximum contaminant levels (MCL's) established for certain  
740 chemicals under the Safe Drinking Water Act.

741 Action-Specific ARARs are usually technology or activity based requirements or limitations on  
742 actions taken with respect to generated wastes. An example of an action-specific requirement would  
743 be the requirement for treatment of hazardous waste to approved standards before it is land disposed.

744 Location-Specific ARARs are restrictions placed on the concentration of hazardous substances or the  
745 conduct of activities solely because they occur in a specific location. An example of location-  
746 specific requirements are laws forbidding the placement of an incinerator near a hospital or school or  
747 the placement of waste in a wetland area.

748 Alternatives #1 and 2 for the X-734 area would not comply with all of the identified ARARs.  
749 Alternatives 3a, 3b, and 4 would comply with all of the identified ARARs.

### 750 3. Long-term Effectiveness and Permanence

751 Long term exposure risks associated with implementation of Alternatives 1 and 2 for the X-734  
752 landfill area would be unacceptable because these alternatives would not satisfy the RAOs.  
753 Alternatives 3a, 3b and 4 would meet the RAOs for all media at the X-734 Area. The permanence of  
754 Alternatives 3a, 3b, and 4 would depend on two factors: 1) the ability to maintain the integrity of the  
755 caps, collection system (3b only), and groundwater treatment system (3b and 4 only), and 2) the

ability to maintain and enforce deed restrictions. These alternatives would provide greater long-term protection than Alternatives 1 and 2 because they would reduce migration of and surface exposure to contaminants.

#### 4. Reduction of Toxicity, Mobility and Volume.

Alternative 1 and 2 for the X-734 Landfill area would not be effective at reducing the toxicity, mobility, or volume of the contaminants. Alternative 3a, 3b and 4 would not include treatment to reduce the toxicity, mobility or the volume of the contaminated media. However, these alternatives would reduce the mobility of the contaminants through capping since the caps would restrict infiltration of surface water. Alternative 3b, would provide additional contaminant containment (the collection trench) would prevent water from landfill seeps and groundwater from entering the North Drainage Ditch and Little Beaver Creek. Alternative 4 would also provide additional containment by collecting groundwater through phytoremediation and prohibiting it from entering the North Drainage Ditch.

#### 5. Short-term Effectiveness

Alternatives 1 and 2 for the X-734 landfill area would not present any short-term exposure risks to current on-site workers or to neighboring populations beyond the risks that currently exists. Alternatives 3a, 3b and 4 would present no short-term exposure risk to neighboring populations although some short-term exposure risks would exist for on-site workers during construction activities. Potential exposure to contaminants could occur during excavation of drainage ditches and preparation of the landfills for capping. Exposure risks during construction activities would be minimized by performing work in accordance with a site-specific health and safety plan, and observing regulatory mandates and ALARA principles.

778 6. Implementability

779 Alternative 1 for the X-734 landfill area involves no implementation concerns or time frames.

780 Alternative 2 for the X-734 landfill area requires construction activities only during installation of the  
781 fence and perimeter ditches. Deed restrictions, fencing, and ditches would be in place within 9-11  
782 months. Alternative 2 would be the most easily implemented and would require the least amount of  
783 time to implement. There is no time element associated with achieving the RAOs since the RAOs  
784 would not be met.

785 Alternative 3a for the X-734 landfill area would require construction of multimedia caps in addition  
786 to the fencing activities; therefore, it would be more difficult to implement than Alternative 2.  
787 Installing the caps would not be a complex task. However, the design and construction of caps would  
788 require special care and considerations. Capping material and experienced personnel would be  
789 readily available. This alternative would not require off-site disposal of any excavated material. The  
790 time required for implementation of this capping alternative would be 17-19 months. RAOs would  
791 be achieved at the end of the construction period.

792 Alternative 3b for the X-734 landfill area would be more difficult to implement than Alternative 3a.  
793 Alternative 3b would require additional design and construction considerations for the collection  
794 trench and groundwater treatment system. Capping materials and experienced personnel would be  
795 readily available. This alternative would not require off-site disposal of any excavated material. The  
796 time required for implementation of this alternative would be 21-23 months. RAOs would be  
797 achieved at the completion of the construction period.

798 Alternative 4 would be less difficult to implement than Alternatives 3a and 3b. Although alternative  
799 4 requires the planting of tress, which includes preparation, irrigation, and semiannual routine  
800 maintenance, the capping requirements for Alternative X-734B in Alternative 4 are less stringent than  
801 those in Alternatives 3a and 3b. Capping materials and experienced personnel would be readily  
802 available. This alternative would not require off-site disposal of any excavated material. The time

803 required for implementation of this alternative would be 17-19 months. The time required to plant  
804 the trees would be about 4 months, but approximately two years would be required for the trees to  
805 reach maturity. RAOs would be achieved at the completion of the cap construction period.

806 7. Cost

807 Total present worth costs include both capital costs and operation and maintenance (O&M) costs.  
808 Present worth is based on a 30-year period for each alternative. The costs in descending order for the  
809 evaluated alternatives for X-734 are as follows:

810 Alternative 3b, Institutional Controls and Containment (Multimedia Cap and Collection Trench):  
811 \$13,720,000.

812 Alternative 3a, Institutional Controls and Containment (Multimedia Cap): \$7,415,000.

813 Alternative 4, Institutional Controls and Containment (Multimedia Cap at X-734/X-734A, Soil Cap at  
814 X-734B, and Phytoremediation): \$6,830,000

815 Alternative 2, Institutional Controls: \$1,081,000.

816 Alternative 1, No Action: *No costs are associated with this alternative.*

817 8. Community Acceptance:

818 Ohio EPA and US EPA evaluated community acceptance via the public comment period. All  
819 comments pertinent to the preferred alternative outlined below is addressed in the responsiveness  
820 summary in this decision document prepared by Ohio EPA for this SWMU.



821 **10.0 OHIO EPA'S SELECTED ALTERNATIVES FOR THE X-734 LANDFILL**  
822 **AREA IN QUADRANT IV OF THE PORTSMOUTH GASEOUS PLANT**

823 *The X-734 Landfill Area* (consisting of the X-734 Old Sanitary Landfill, the X-734A  
824 Construction Spoils Landfill, and the X-734B Construction Spoils Landfill.

825 The Ohio EPA's selected alternative for the X-734 Landfill Area SWMUs is Alternative 4,  
826 Institutional Controls and Containment (Multimedia Cap at X-734/X-734A, Soil Cap at X-  
827 734B, and Phytoremediation.) Alternative 4 has been designed to contain the soil, waste, and  
828 debris of the landfills. The alternative would not treat or remove any waste from the landfills;  
829 however, contaminated groundwater may be removed and treated by phytoremediation if  
830 contaminants migrate from beneath the X-734B landfill. Soil, waste, and debris would be  
831 contained under a multimedia cap or soil cap to prevent potential for contaminant migration  
832 from the landfills. Phytoremediation (trees) would also be used downgradient of X-734B to  
833 capture and remediate any groundwater that could potentially migrate from beneath the landfill.

834 This alternative requires the landfill to be capped in accordance with Ohio Solid/Hazardous  
835 waste requirements, and includes institutional controls to prevent inappropriate access and  
836 development on the landfill as well as the abandoning of existing wells within the limits of  
837 waste at the X-734B portion of the landfill. This alternative provides the best balance of trade-  
838 offs when considering the criteria used to evaluate the remedies presented in the CAS/CMS.  
839 The Ohio EPA believes that this remedy will be protective of human health and the  
840 environment by containing the landfilled wastes and capturing and containing any groundwater  
841 which may migrate from beneath the X-734B portion of the landfill. This alternative meets  
842 ARARs, is cost-effective, and will provide long-term effectiveness.

843 For evaluation purposes, a multimedia cap design was described for this alternative in the  
844 CAS/CMS. The multimedia cap would consist of the following layers, from bottom to top: a  
845 compacted soil subgrade, a geosynthetic clay liner (GCL), a flexible membrane liner (FML), a

846 drainage layer, a frost protection layer, and a vegetative layer to prevent erosion. While Ohio  
847 EPA does not anticipate changes to this conceptual design, actual design details will be  
848 determined during the Corrective Measures Implementation (CMI). However, the final design  
849 must comply with Subtitle C/D and Ohio Solid/Hazardous Waste capping requirements. The  
850 layers in the soil cap at X-734B would consist of a compacted cohesive layer and a vegetative  
851 layer to prevent erosion. The soil cap will be engineered to meet Ohio Construction and  
852 Demolition Debris (C&D) requirements. Final soil cap design specifications will be  
853 determined during the Corrective Measures Implementation (CMI). If site conditions change  
854 at the X-734B landfill (i.e. levels of groundwater contamination increases significantly),  
855 modifications to the cap could be added at a later date.

856 The collection trench described in Alternative 3b was considered; however, because significant  
857 groundwater contamination does not currently exist, and because the cap is expected to  
858 eliminate or significantly decrease leachate generation from the landfill, it was determined that  
859 a collection trench is not necessary at this time. If site conditions change, (i.e. leachate  
860 continues to be detected or the levels of groundwater contamination increases significantly at  
861 X-734/X-734A) a collection trench or in-situ treatment such as phytoremediation and  
862 associated treatment components could be added at a later date.

863 Remedial effectiveness monitoring will be conducted to ensure the integrity and performance  
864 of the landfill caps. Such monitoring will include groundwater (upgradient and downgradient),  
865 and surface water monitoring in Little Beaver Creek and the North Drainage Ditch. The need  
866 for modifications to existing monitoring wells other than those specified above or installation  
867 of new wells will be determined as part of the CMI.

868 This Decision Document took into account all the eight criteria listed above.

869 **11.0 RESPONSIVENESS SUMMARY FOR THE X-734, X-734A AND X-734B**  
870 **LANDFILL AREA IN QUADRANT IV FOR THE US DOE**  
871 **PORTSMOUTH GASEOUS DIFFUSION PLANT**

872 **11.1 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC**  
873 **COMMENT PERIOD**

874 **11.2 Overview**

875 This responsiveness summary responds to significant comments submitted on the preferred plan  
876 for Quadrant IV of the Portsmouth Gaseous Diffusion Plant including the X-734, X-734A and X-  
877 734B Landfill Area and is intended to be consistent with Sections 113(k) (2) (B) (iv) and 117(B)  
878 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980  
879 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986  
880 (SARA). This section requires that Agency respond "... to each of the significant comments,  
881 criticisms, and new data submitted in written or oral presentations" on the preferred plan. No  
882 comments pertaining to the alternative selected for the X-734 Landfill area were made during  
883 the public comment period ended June 30, 1999.

884 The administrative record index for the U.S. Department of Energy (U.S. DOE) site which  
885 includes the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), the  
886 Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) and the Preferred Plan is  
887 available to the public at the US DOE Environmental Information Center located in Piketon,  
888 Ohio. The final Quadrant IV RFI was submitted to Ohio EPA and U.S. EPA on January 2, 1997.  
889 The RFI was approved on September 5, 1997. The CAS/CMS Report was submitted on August  
890 21, 1998 and was approved on October 19, 1998. The amended Quadrant IV Final CAS/CMS  
891 Report was approved on January 22, 1999. The public notice alerting the public of their  
892 opportunity to comment on the preferred plan was placed in the *Pike County News Watchman*

893 and *Pike County Advertiser* on May 30, 1999 The public comment period closed on June 30,  
894 1999. A public meeting to discuss the preferred plans was held on June 3, 1999 at the Comfort  
895 Inn in Waverly, Ohio.

### 896 11.3 Summary of Comments

897 The public comments regarding the U.S. DOE site are organized into the following categories:

898  
899 (1) Summary of comments and Agency responses to citizens regarding the preferred  
900 plan;

901 (2) Summary of comments from US DOE and Agency responses.

902 There were no public comments submitted on the preferred remedy for the X-734 Landfill  
903 area.

## **APPENDIX 1**

### **ARARS**

## 1.0 INTRODUCTION

This appendix provides a discussion pertinent to federal and state applicable or relevant and appropriate requirements (ARARs) which may be considered for corrective measures proposed for the X-734 Old Sanitary Landfill, X-734A Construction Spoils Landfill, and X-734B Old Construction Spoils Landfill located in Quadrant IV at the Portsmouth Gaseous Diffusion Plant (PORTS) in Piketon, Ohio.

In the absence of federal- or state-promulgated regulations, certain criteria, advisories, guidance values, and proposed standards, although not legally binding, may serve to supplement an ARAR provision by providing useful guidance for setting protective cleanup levels. These are not potential ARARs but are "to be considered" (TBC) guidance.

## 2.0 REGULATORY HISTORY OF PORTS

A Cleanup Alternative Study/Corrective Measures Study (CAS/CMS) being conducted for PORTS is intended to develop alternatives for remediating hazardous and radioactive contamination present in PORTS groundwater and soil as a result of plant operations. PORTS, which is owned by the United States Department of Energy (U.S. DOE), currently enriches uranium for electrical power generation and until 1991 provided highly enriched uranium to the U.S. Navy.

The environmental restoration program at PORTS is the subject of two enforcement actions. The State of Ohio issued a Consent Decree August 31, 1989, requiring a CAS. An Administrative Order by Consent (AOC) between the U.S. Environmental Protection Agency (U.S. EPA) and DOE under the authority of Section 3008(h) of Resource Conservation and Recovery Act (RCRA) and Sections 104 and 106(a) of the CERCLA Act of 1980 was issued effective September 27, 1989, and amended May 11, 1994. The U.S. EPA AOC includes requirements for a CMS for solid waste management units (SWMUs) that parallel requirements of the state of Ohio Consent Decree. Tasks in the AOC are patterned after the proposed RCRA corrective action process to be promulgated in Title 40 *Code of Federal Regulations* (CFR) Part 264 Subpart S. The AOC also suggests that CERCLA requirements be integrated into the corrective action process as ARARs or regulatory drivers to address releases of hazardous substances that are not hazardous waste. The intent of implementing CERCLA guidance at PORTS is to supplement policies and decisions not specifically included under RCRA.

CERCLA on-site remedial response actions must comply only with the substantive requirements of a regulation and not the administrative requirements to obtain federal, state, or local permits [CERCLA §121(e)]. To ensure that CERCLA response actions proceed as rapidly as possible, the U.S.

EPA has reaffirmed this position in the final National Contingency Plan (NCP) (55 Federal Register (FR) 8756). Substantive requirements pertain directly to the actions or conditions at a site. Administrative requirements facilitate the implementation of those substantive requirements. Although these administrative requirements are not ARARs under the CERCLA process, compliance with all administrative requirements (not summarized in this appendix) is necessary until PORTS is listed on the National Priorities List (NPL). Section 121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with ARARs or standards under federal and state environmental laws.

### 3.0 DEFINITION OF TERMS

The terms defined in the following sections of the appendix are those essential to understanding the information in the appendix.

Applicable requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site" (40 CFR 300.5).

Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site" (40 CFR 300.5).

#### 3.1 Chemical, Location, and Action-Specific ARARs

ARARs will govern remediation activities, generation and management of waste streams, and final disposition of waste streams. To-be-considered guidance will be integrated with ARARs as non-promulgated standards. The following paragraphs provide brief explanations of chemical-, location-, and action-specific ARARs.

#### 3.2 Chemical-Specific ARARs

Chemical-specific requirements set health or risk-based concentration limits or discharge limitations in various environmental media for specific hazardous substances, pollutants, or contaminants (53 FR

51394). Although limited in number, chemical-specific standards have been established under several statutes, including RCRA, Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), and Clean Air Act (CAA). These requirements generally set protective cleanup levels for the chemicals of concern in the designated media or else indicate a safe level of discharge that may be incorporated when considering a specific remedial activity.

### 3.3 Location-Specific ARARs

Location-specific requirements set restrictions upon the concentration of hazardous substances or the conduct of activities solely because these substances or activities are in special locations (53 FR 51394). Location characteristics that trigger ARARs include the presence of sensitive resources such as wetlands, flood plains, cultural resources, historic sites, and endangered or threatened species.

### 3.4 Action-Specific ARARs

Performance, design, or other action-specific requirements set controls or restrictions on particular types of activities related to the management of hazardous waste (53 FR 51394). Selection of a particular remedial action at a site will invoke the appropriate action-specific ARARs. These ARARs may specify particular performance standards or technologies as well as specific environmental cleanup levels for discharged or residual chemicals remaining after treatment or following remedial activities.

## 4.0 ARARs STATUS

ARARs will govern the remediation activities, generation and management of waste streams, and final disposition of waste streams. To ensure protection of human health and the environment, and to ensure proper management of waste, the Ohio EPA and DOE are establishing a list of Federal and State of Ohio promulgated standards, requirements, and cleanup criteria that will be met during the implementation of the remedial activities. The Federal and State of Ohio promulgated standards, requirements, and cleanup criteria presented in Table B.1 include requirements from the Ohio Administrative Code (OAC), Ohio Revised Code (ORC), U.S. EPA Guidance, DOE Orders and Title 40 *Code of Federal Regulations* (CFR). To-be-considered (TBC) guidance will be integrated with ARARs as non-promulgated standards.

This list of ARARs is preliminary in nature and provides a broad spectrum of ARARs for consideration in the Preferred Plan. After the selected remedial action alternative for Quadrant IV is chosen, a final list of ARARs will be negotiated and incorporated into the CMI. The preliminary list of ARARs and TBC guidance is presented in Table B.1.

[Note: a list of acronyms is included at the end of Table B.1.]



Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Historic Preservation (Location)	DOE must take into account the effect of an undertaking on Historic Properties and accord the Advisory Council on Historic Preservation a reasonable opportunity to comment. Historic properties are defined as any prehistoric or historic district, building, site, structure, or object included or eligible for inclusion in the National Register of Historic Places.	This requirement will include the terms associated with artifacts, records, and persons released to and located within such properties. Historic properties that are to be substantially altered or demolished must be recorded for future use and reference - applicable.	National Historic Preservation Act 16 U.S.C. 470C (Federal) Consideration of Historic Properties 36 CFR Part 800
Archeological resource recovery and preservation (Action/Location)	Upon discovery that a project may cause irreparable loss, destruction, significant scientific finding, prehistoric finding, or loss of historical or archeological data, DOE must notify the Department of Interior in writing and provide appropriate information concerning the project. DOE must, with possible assistance from State Historical Preservation Officer (SHPO), undertake recovery, protection and preservation of the data. Prior to any Federal undertaking which may directly and adversely affect any National Historic landmark, the Director of Ohio EPA of the responsible agency shall, to the extent possible, minimize the harm to such landmark.	No person shall excavate, remove, damage, or otherwise alter or deface or attempt to excavate, remove, damage, or otherwise alter or deface any archeological resource located on public lands unless such activity is pursuant to a permit. If an EPA activity may cause irreparable loss or destruction of significant scientific, prehistoric, historic, or archeological data, the responsible official or the Secretary of the Interior is authorized to undertake data recovery and preservation activities - applicable.  [NOTE: The National Environmental Policy Act requires that federal projects be evaluated to consider adverse effects on archeological and historical sites.]	Archeological and Historic Preservation Act 16 U.S.C. 469, 470 Procedures for Implementing the National Environmental Policy Act (NEPA) 40 CFR 6.301(a),(h)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Protection of wetlands (action)	Federal agencies conducting certain activities must avoid, to the extent possible, the adverse effects and impacts associated with destruction or loss of wetlands and to avoid support of new construction in wetlands when a practicable alternative exist.	Consideration will be given by DOE to protect wetlands associated with the area near the sites undergoing remediation in Quadrant IV - applicable.	Procedure for Implementing NEPA 40 CFR 6.302(a)  Executive Order 11990
Flood plain management (action)	Federal agencies must evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, adverse effects with the direct or indirect development of a floodplain.	DOE must consider floodplain areas located within or effected by the Quadrant IV remedial action - applicable.	Procedures for Implementing NEPA 40 CFR 6.302(b)  Executive Order 11988
Floodplain (action)	The limits of solid waste placement and the leachate management system cannot be located in a regulatory floodplain, unless deemed necessary by the Director of Ohio EPA.	Measures will be taken to ensure that the regulatory requirements identified as applicable or relevant and appropriate under this regulation will be adhered to - applicable.	OAC 3745-27-20(c)(2)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Floodplain/wetlands (Location)	DOE shall exercise leadership and take action to: <ul style="list-style-type: none"> <li>(1) avoid to the extent possible long- and short-term adverse impacts associated with the destruction of wetlands and the occupancy and modification of floodplain and wetlands, and avoid direct and indirect support of floodplain and wetlands development wherever there is a practicable alternative.</li> <li>(2) incorporate floodplain management goals and wetlands protection considerations into its planning, regulatory, and decision-making processes and shall to the extent practicable: <ul style="list-style-type: none"> <li>(a) reduce the hazard and risk of flood loss.</li> <li>(b) minimize the impact of floods on human safety, health and welfare.</li> <li>(c) restore and preserve natural and beneficial values served by the floodplain.</li> <li>(d) minimize the destruction, loss or degradation of wetlands.</li> <li>(e) preserve and enhance the natural and beneficial values of wetlands.</li> </ul> </li> </ul>	<p>DOE will undertake a careful evaluation of the potential effects of any DOE action taken in a floodplain and any new construction undertaken by DOE in wetlands not located in a floodplain.</p> <p>DOE will identify, evaluate, and as appropriate, implement alternative actions which may avoid or mitigate adverse floodplain/wetlands impacts.</p> <p>DOE will provide opportunity for early review of any plans or proposals for actions in floodplain and new construction in wetlands.</p> <p>DOE must consider wetlands and areas located within or effected by the Quadrant IV remedial action - applicable.</p>	DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR 1022.3(a),(b)(1),(2),(3),(5),(6),z,(d),(e), 1022.5(b),(h), and 1022.11(a),(b),(c)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Best Management Practices Program (MP) (Action)	<p>BMP programs shall be developed in accordance with good engineering practices and:</p> <ol style="list-style-type: none"> <li>(1) be documented in a narrative form, including necessary plot plans, drawings, and maps,</li> <li>(2) establish specific objectives for the control of toxic and hazardous pollutants, and</li> <li>(3) establish specific best management practices to meet the specific objectives for control of toxic and hazardous pollutants to the waters of the United States.</li> </ol>	The substantive portions of this regulation may apply to the remedial action(s) undertaken - applicable.	40 CFR 125.104 Subpart K
Noise control (Action)	The public must be protected from noises that jeopardize health and welfare.	Because vehicles and equipment would be involved in certain aspects of the remedial action, all substantive requirements of the act are applicable - applicable.	<p>Noise Control Act, as amended 42 U.S.C. 4901 et. seq.</p> <p>Noise Pollution and Abate Act 42 U.S.C. 7641</p>
Solid waste closure regulations (RCRA subtitle D Municipal) (Action)	RCRA Subtitle D regulations cover the location, operation, and closure of municipal solid waste landfills. Subpart F of 40 CFR 258 covers closure and post-closure.	The substantive portions of 40 CFR 258 Subpart F are identified due to capping requirements - relevant and appropriate.	<p>RCRA Subtitle D Municipal Solid Waste Closure Regulations</p> <p>40 CFR 258 Subpart F</p>
RCRA corrective actions (Action)	The following promulgated requirements are Federal statutory requirements for RCRA corrective actions.	The remedial action(s) are being conducted pursuant to RCRA and CERCLA requirements - applicable.	RCRA Corrective Actions - Sections 3004(u), 3005(c)(3), 3008(h), and 7003

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Radiation protection of public and environment (Chemical)	DOE Orders relating to radiation dose limit, as low as reasonably achievable policy, control of residual radioactive material, management and control of radioactive material, management and control of radioactive materials in liquid discharges, radiation protection of public and the environment, and derived concentration guides for radionuclides contain criteria and guidelines to be considered for management of radioactive material.	Management of any materials during remedial action(s) that are contaminated with radioactive compounds should consider the criteria and guidelines established in this DOE Order - TBC.	DOE Order 5400.5
Management of low-level radioactive waste (Chemical)	DOE Order 5820.2A states "low-level radioactive waste may be disposed by methods appropriate to achieve the performance objectives of the disposal facility." Low-level radioactive waste must be disposed of on-site, if possible.	Management of any materials that may be considered low-level radioactive waste should consider the criteria and guidelines established in this DOE Order. If on-site disposal capacity for LLW is insufficient, off-site disposal must be at another DOE facility. An exemption is required for disposal of LLW off-site - TBC.	DOE Order 5820.2A (III)
RCRA corrective actions (proposed regulations) (Action)	RCRA corrective actions are the proposed regulations identified for implementation.	The proposed Subpart S regulations pertaining to RCRA corrective actions are to be considered during remedial actions - TBC.	40 CFR 264 Subpart S

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Mixed LLW (Chemical)	To ensure that inappropriate shipments of mixed waste are not occurring, the DOE Office of Environment Restoration and Waste Management issued a Performance Objective for Certification of Nonradioactive Hazardous Waste.	The basic premise of the performance objective is that no mixed waste is to be shipped off-site to a facility not specifically licensed for the radioactive component of the waste - TBC.	DOE Order 5820.20A
	In accordance with DOE Order 5820.2A, mixed waste is to be disposed of on the site where it was generated, if possible.	The waste must be shipped to an off-site treatment/disposal facility holding both a RCRA permit and a NRC permit - TBC.	
RCRA corrective action (Action)	Guidance from EPA on conducting RCRA corrective actions.	The RCRA Corrective Action Plan guidance is to be considered for the remedial action - TBC.	RCRA Corrective Action Plan OSWER Directive No. 9902.3-2A
Chemicals in drinking water (Solid Waste Disposal Facility) (Chemical)	A solid waste disposal facility shall not contaminate an underground drinking water source beyond the solid waste boundary (outermost perimeter of the waste). The concentration of chemicals shall not exceed background levels or listed maximum contaminant levels (MCLs), whichever is higher.	These requirements would be relevant and appropriate because the SWMUs contains several of the constituents and/or chemicals listed in the regulation - relevant and appropriate.	40 CFR 257.4
Classification of solid waste disposal facilities and practices (Chemical)	Solid waste disposal facilities or practices shall not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife.	The practices shall not result in the destruction or adverse modification of critical habitat of endangered or threatened species identified in 50 CFR Part 17 - applicable.	40 CFR 257.3-2.

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Endangered and threatened species and plants (Location)	All Federal agencies must ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the constituent elements essential to conservation of a listed species within a defined critical habitat.	Additional requirements could apply if it is determined that the remedial action could adversely affect these species or their habitat - applicable.	Endangered Species Act 16 U.S.C. 1531, et. Seq.  Endangered and Threatened Wildlife and Plants 50 CFR 17.21, 17.31, 17.61, 17.71 and 17.94
Required technical information for sanitary landfills (Action)	Specifies the minimum technical information required of solid waste permit to install. Included are hydrogeologic investigation report, leachate production and migration information, surface water discharge information, design calculations and plan drawings.	This ARAR will present substantive requirements of a solid waste permit to install. Pertains to any new solid waste disposal facility created on-site and expansions of existing solid waste landfills. Pertains to existing areas of contamination that are capped per solid waste regulations. The regulations establish the minimum information required during the remedial design stage - applicable.	Interagency Cooperation- Endangered Species Act 50 CFR 402.01  OAC 3745-27-06(B)(C)
Construction specifications for sanitary landfills (Action)	Specifies the minimum requirements for the soil/clay layers.	Pertains to any new solid waste disposal facility located on-site and any expansions to existing solid waste landfills. Requirements applicable to areas of contamination that are capped per solid waste regulations - applicable.	OAC 3745-27-08(C), (D thru H)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Sanitary landfill - groundwater monitoring (action)	Groundwater monitoring program must be established for all sanitary landfill facilities. The system must consist of a sufficient number of wells that are located so that samples indicate both upgradient (background) and downgradient water samples. The samples must be designed per the minimum requirements specified in this rule. The sampling and analysis procedures used must comply with this rule.	Applies in order to ensure that proper operation and maintenance is maintained at the unit. Wells have been installed both upgradient and downgradient. Sampling and analysis procedures required by this rule shall be incorporated into site procedures - relevant and appropriate.	OAC 3745-27-10(B)(C)(D)
Final closure of sanitary landfill facilities (action)	Final closure standards will require the closure of a landfill in a manner which minimizes the need for post-closure maintenance and minimizes post-closure release of leachate or explosive gases to air, soil, groundwater or surface water. The requirement specifies acceptable cap design, soil, barrier layer, granular drainage layer, soil and vegetative layer. Will also provide for use of comparable materials to those specified with approval of Director of Ohio EPA.	Although these requirements apply to new solid waste landfills being created on-site, any expansion of existing solid waste landfills on-site and any existing areas of contamination that are capped in place per the solid waste rules - relevant and appropriate.	OAC 3745-27-11(B)(C)



Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Sanitary landfill-explosive gas monitoring (Action/Chemical)	Establishes requirements for an explosive gas monitoring plan, which is required for solid waste landfills. Specifies the minimum information required in such a plan, including detailed engineering plans, specifications, information on gas generation potential, sampling and monitoring procedures, etc. Mandates when repairs must be made to an explosive gas monitoring system.	Pertains to any site which has had or will have putrescible solid waste placed on-site and which has a residence or other occupied structure located within 1000 feet of the emplaced solid waste - relevant and appropriate.	OAC 3745-27-12 (A)(B)(D)(E)(M)(N)
Disturbance where hazardous or solid waste facility was operated (Action)	Requires that a detailed plan be provided to describe how any proposed filling, grading, excavation, building, drilling, or mining on land where a hazardous water facility or solid waste facility was operated will be accomplished. This information must demonstrate that proposed activities will not create a nuisance or adversely affect the public health or the environment. Special terms to conduct such activities may be imposed by the Director of Ohio EPA to protect the public and the environment.	Parameters and schedule for explosive gas monitoring must be identified for any disposal site where explosive gas monitoring may be a threat - relevant and appropriate.	OAC 3745-27-12(I)(J)  OAC 3745-27-13(C)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
<p>st-closure care of sanitary landfill facilities (Action)</p>	<p>Specifies the required post-closure care for solid waste facilities. Includes continuing operation of any leachate or surface water management systems, maintenance of the cap systems, and groundwater monitoring.</p>	<p>Although these requirements apply to new solid waste landfills being created on-site, any expansion of existing solid waste landfills on-site and any existing areas of contamination that are capped in place per the solid waste rules are covered under these requirements. The requirement applies to ensure proper operation and maintenance is maintained at the unit - relevant and appropriate.</p>	<p>OAC 3745-27-14(A) 40 CFR 267.23</p>
<p>sanitary landfill operations - leachate management, final cover, and surface water management: (Action)</p>	<p>Includes requirements for the final cap - system for areas at final elevations.</p>	<p>Although these requirements apply to new solid waste landfills being created on-site, any expansion of existing solid waste landfills on-site and any existing areas of contamination that are capped in place per the solid waste rules - relevant and appropriate.</p>	<p>OAC 3745-27-19(I)</p>
	<p>Surface water must be diverted from areas where solid waste is being, or has been, deposited. Also requires run-on and run-off to be controlled to minimize infiltration through the cover material and to minimize erosion of the cap system.</p>	<p>Pertains to new solid waste disposal facilities to be created on-site and existing landfills that will be expanded during remediation. Applies to existing areas of contamination that will be capped in-place per solid waste rules - relevant and appropriate.</p>	<p>OAC 3745-27-19(J)</p>

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Sanitary landfill operations - leachate management, final cover, and surface water management. (Action) (Continued)	Requires repair of leachate outbreaks; collection and treatment of leachate on the surface of the landfill; and action to minimize control or eliminate conditions causing leachate outbreaks.	Applies in order to ensure that proper operation and maintenance is maintained at the unit - relevant and appropriate.	OAC 3745-27-19(K)
Water/air permit criteria for decision by the director (Action)	A permit to install (PTI) or plans must demonstrate best available technology (BAT) and shall not interfere with or prevent that attainment or maintenance of applicable air quality standards.	Pertains to any site that will discharge to on-site surface water or will emit contaminants into the air. Surface water may be discharged to waters of the state before and after construction in accordance with the CWA requirements - applicable.	OAC 3745-31-05
Water quality criteria for decision by the Director of Ohio EPA (Action)	Specifies substantive requirement and criteria for Section 401 water quality criteria for dredging, filling, obstructing or altering waters of the state.	Pertains to any site that has or will affect waters of the state. The potential exist for discharge to waters of the state before or after construction in accordance with the CWA requirements. There is also a possibility that the remedial alternative chosen may require state waterways to be altered - applicable.	OAC 3745-32-05
Monitoring frequency for radioactivity (Chemical)	Presents monitoring requirements for radioactivity.	Pertains to any site which has contaminated groundwater or surface water that is either being used, or has the potential for use, as a drinking water source - applicable.	OAC 3745-81-26(A)(B)(C)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Maintenance and operation of groundwater wells (action)	Establishes specific maintenance and modification requirements for casing, pump and wells in general.	Applies to the installation of groundwater monitoring well(s) to prevent the contamination of the well. Water well standards are incorporated into PORTS SOPs - relevant and appropriate.	OAC 3745-9-09(A thru C) OAC 3745-9-09(D(1)) OAC 3745-9-09(E thru G)
Abandonment of test holes and wells (action)	Following completion of use, wells and test holes shall be completely filled with grout or similar material or shall be maintained in compliance of all regulations.	Applies to the installation of groundwater monitoring well(s) to prevent the contamination of the well. Water well standards are incorporated into PORTS SOPs - applicable.	OAC 3745-9-10(A)(B)(C)
Endangered plant species (location)	Prohibits removal or destruction of endangered plant species. No person shall root up, injure, destroy, remove from public highways, public property, or waters of the state, or on or from the property of another, without the written permission of the owner, lessee, or other person entitled to possession, any endangered or threatened plant listed in OAC 1501-18-1.	Applies to remediation sites where chemicals may harm endangered species. Clearly establishes that receptor plant species must be considered in risk assessments. This act may require consideration for displacement of large volumes of surface soils. Appropriate action will be taken in the event that an endangered or threatened species is discovered - applicable.	OAC 1501-18-1(03)(A) ORC 1518.02
Endangered animal species (location)	No person shall take or possess any native species of wild animal, or any eggs or offspring thereof, that is threatened with site-wide extinction.	Applies to remediation sites where chemicals may harm endangered species. May apply at sites where remediation could disturb existing habitats - applicable.	OAC 1501-31-23(01) OAC 1501-31-23(A thru B) ORC 1531.25

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Standard for active asbestos waste site (Action/Chemical)	Establishes operating standards for an active asbestos waste disposal site.	Pertains to sites where asbestos has come to be located and must be consolidated on-site. The remedial action undertaken will implement control measures to prevent disturbance and release to the atmosphere of any asbestos containing material - applicable.	OAC 3745-20-06(A)(B)
Standard for inactive asbestos waste site (Action/Chemical)	Establishes operating standards for an inactive asbestos waste disposal site.	Pertains to sites where asbestos has been located. This requirement will also consider inadequate cover or areas where asbestos will be consolidated. The remedial action undertaken will implement control measures to prevent disturbance and release to the atmosphere of any asbestos containing material - applicable.	OAC 3745-20-07(A)(B)(C)
Institutional controls (Action)	Controls recommended include restrictions on land use, deed restrictions, well drilling prohibitions, well use advisories, and deed notices.	Long-term management of contamination left in place - applicable.	40 CFR 300.430(e)(3)
	Controls include but are not limited to periodic monitoring, appropriate shielding, physical barriers (i.e., fences, warning signs) to prevent access, inspection and repair of coverings, temporary dikes, drainage courses, and appropriate radiological safety measures to ensure protection during activities at the site.	Interim management of residual radioactive material above guidelines, including but not limited to that material left in accessible locations - TBC.	DOE Order 5400.5(IV)(6)(c)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
groundwater protection: (applicability)	The groundwater program, including monitoring requirements and associated activities will be consistent with the PORTS groundwater protection program, remedial action objectives (RAOs), selected remedial alternative(s).	The selected remedial alternative will be designed to achieve regulatory compliance with the established groundwater protection standard(s) - applicable.	OAC 3745-54-90
Operational - groundwater protection (Action)	Requires the establishment of detection, compliance, and corrective action monitoring program to ensure protection of groundwater by assessing the performance of the TSD facility during operation.	The groundwater monitoring program is required to be performed during the post-closure period for land disposal facilities where hazardous waste remain after closure. The post-closure monitoring needs to be conducted for a period of 30 years unless the regulatory agency approves an earlier termination date or requires that monitoring period be extended - applicable.	40 CFR 264, (all applicable requirements of Subpart F - OAC 3745-54-91 thru 3745-54-99)
groundwater corrective action program (Chemical)	Presents the requirements of a groundwater corrective action program that prevents hazardous constituents from exceeding their respective concentration limits at compliance point either by removal or treatment of the constituents.	Remedial action is currently being conducted or being developed to address the contaminants and/or constituents in groundwater at PORTS which exceed their concentration limits - relevant and appropriate.	OAC 3745-55-01
acts of pollution prohibited (Action)	Pollution of waters of the state will be prohibited. Establishes regulations requiring compliance with national effluent standards which may have a point source discharge.	Pertains to any site which has contaminated on-site groundwater or surface water or will have a discharge to on-site surface water or groundwater - applicable.	OAC 6111.04 OAC 6111.04.2

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
The "Five Freedoms" for surface water (Chemical)	All surface water of the state shall be free from: (1) objectional suspended solids (2) floating debris, oil, and scum (3) materials that create a nuisance (4) toxic, harmful, or lethal substances	Pertains to both discharges to surface water and any on-site surface waters affected by site conditions during and/or after remedial action(s) - applicable.	OAC 3745-1-04(A)(B)(C)(D)(E)
Antidegradation policy for surface water (Chemical)	(5) nutrients that create nuisance growth.  Prevents degradation of surface water quality below designated use or existing water quality. Existing instream uses shall be maintained and protected. The most stringent controls for treatment shall be required by the Director of Ohio EPA to be employed for all new and existing point source discharges. Prevents any degradation of "State Resource Waters".	Requires that best available technology (BAT) be used to treat surface water discharges. This requirement may be applied to set standards when existing water quality is better than the designated use - relevant and appropriate.	OAC 3745-1-05(A)(B)(C)
Mixing zone for surface water (Chemical)	Presents the criteria for establishing non-thermal mixing zones for point source discharges, and presents the criteria for establishing thermal mixing zones.	This requirement would pertain to an alternative which could result in a point source discharge to waters of the state or when establishing an alternative discharge point - applicable.	OAC 3745-1-06(A)(B)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Water quality standards and criteria (action)	Specifies analytical methods and collection procedures for surface water discharges.	Surface water may be discharged into waters of the state during remedial actions. The required analytical and collection techniques are to be incorporated into the site standard operating procedures (SOPs) - applicable.	OAC 3745-1-03 40 CFR Part 136
	May be applicable to pollutants which do not have specific numerical or narrative criteria identified in Tables 7-1 thru 7-15 of this rule.	Surface water may be discharged into waters of the state during remedial action. Pertains to both discharges to surface waters as a result of the remedial action and any surface waters affected by site conditions - applicable.	OAC 3745-1-07(C)
Water use designation for Scioto River (action/Location)	Establishes water use designations for stream segments within the Scioto River Basin.	Pertinent if stream or stream segment is on-site and is either affected by site conditions or if selected remedial alternative includes direct discharge. Waste load allocations may have to be established and/or modified - applicable.	OAC 3745-1-09



Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Stormwater discharge associated with industrial activity (Action)	A discharge composed entirely of stormwater associated with industrial activities is required to obtain a NPDES permit. These categories of facilities are considered engaging in "industrial activity".	Sediment and erosion controls and BMP must be used to control run-off from installation and construction activities. Control of stormwater discharge associated with construction activities at industrial sites that result in a disturbance of greater than five acres of total land area - applicable.	40 CFR 122.26(a)(1)(ii) 40 CFR 122.26(b)(14)(v)(x)
	(1) landfills, land application sites, and open dumps that receive or have received any industrial waste (waste that is received from any of the facilities described under this section) including those that are subject to regulation under Subtitle D of RCRA.	For those sites with less than five acres affected - relevant and appropriate.	
	(2) also includes construction activities including clearing, grading, and excavation activities that disturbs five acres or more of total area.		

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisite	Citation
Water pollution control (Action)	No discharge to waters of the state that will exceed discharge limits presented in the NPDES Permit shall occur. All discharges to waters of the state resulting from treatment systems such as a pump-and-treat system will meet the substantive requirements for discharge permits.	Prohibits failure to comply with requirements of sections 6111.01 to 6111.08 or any rules, permit or order issued under those sections - applicable.	ORC 6111.07(A)(C)
"Digging" where hazardous or solid waste facility was located (Action/Location)	Filling, grading, excavating, building, drilling or mining on land where a hazardous or solid waste facility was operated is prohibited without prior authorization from the Director of Ohio EPA.	Pertains to any site at which hazardous or solid waste has come to be located. Certain alternatives include potential excavation activities which may uncover solid and/or hazardous waste. Should remedial activities require the management of such waste, an exemption to permitting and other requirements may be warranted - applicable.	ORC 3734.02(H)
Explosive gas monitoring (Action/Location)	Several SWMIs may require explosive gas monitoring plans prior to any construction activities. The Director of Ohio EPA may order an owner or operator of a facility to implement an explosive gas monitoring and reporting plan should one not already be established.	Pertains to sanitary landfills except for those that dispose of non-putrescible waste - relevant and appropriate.	ORC 3734.04.1

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Protection of human health and the environment (Action)	The Director of the Ohio EPA shall adopt and may modify, suspend, or repeal rules for solid waste facilities in order to ensure that the facilities will be located, maintained, and operated, and will undergo closure and post-closure care, in a sanitary manner so as not to create a nuisance, cause or contribute to water pollution, or create a health hazard, or violate 40 CFR 237.3-2 or 257.3-8.	A waiver for this requirement may be required - relevant and appropriate.	ORC 3734.02(A)
Additional permit information: hazardous waste TSD in miscellaneous units (Action)	Establishes substantive hazardous waste permit requirements necessary for Ohio EPA to determine adequacy of miscellaneous units used to treat or store hazardous waste. Includes information such as waste characteristics, detailed design plans and reports, control of run-on and run-off, closure information, etc. See OAC 3745-57-90 to 3745-57-93 for additional requirements for miscellaneous units.	Pertains to sites where hazardous waste may be stored, treated or disposed in miscellaneous units. This requirement will apply to ensure that proper operation and maintenance is maintained at the unit - relevant and appropriate.  [NOTE: This requirement will be fulfilled through the CMS/CM process including and not limited to the remedial design phase.]	OAC 3745-50-44(C)(9)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Dilution prohibited as treatment (Action)	Prohibits dilution of restricted waste or residuals resulting from treatment of restricted waste (as a substitute for adequate treatment) in order to land disposed a restricted waste.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - relevant and appropriate.	OAC 3745-59-03(A)(B)
Hazardous waste analysis (Action)	Generators shall test the waste or test extract of the waste according to the frequency and test methods described in the rule to determine if the waste is restricted from land disposal.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - relevant and appropriate.	OAC 3745-59-07(A)(B)(C)
Restricted waste that exhibit a characteristic (Action/Chemical)	Prohibits land disposal of characteristic waste unless the waste complies with treatment standards of listed waste. If the waste is both listed and characteristic, the treatment standard for the listed waste will operate in lieu of the standard for the characteristic waste.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - relevant and appropriate.	OAC 3745-59-09
Prohibition on storage of restricted waste (Action)	Prohibits on-site storage of hazardous waste restricted from storage beyond a specified time frame stated in the rule.	Pertains to any site in which storage of hazardous waste will occur on-site to facilitate proper recovery, treatment or disposal. The PORTS site has been granted an extension to store restricted waste beyond the regulatory suggested time frame - 171C.	OAC 3745-59-50(A)(B)(C)(D)(E)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Waste specific prohibitions (Chemical)	Prohibits land disposal of the following wastes: (1) liquid waste with pH < or = 2 (2) liquid waste containing PCBs with concentrations > or = 50 ppm (3) liquid waste with halogen organic loading of > or = 100 mg/l and < 10,000 mg/l	Pertains to any site in which on-site land disposal of PCB or HOC contaminated waste may be disposed as part of an alternative. However, there will be no first-third waste disposed of at the PORTS site during and/or after any remedial action - TBC.	OAC 3745-59-32(A)(D)(E)(F)
California listed waste prohibited (Chemical)	Prohibits on-site land disposal of first-, second-, third-third waste unless requirements of paragraph D, E, F, and G are met.	Pertains to any site in which on-site land disposal of first-, second-, third-third hazardous waste may be disposed as part of an alternative. However, there will be no first third waste disposed of at the PORTS site during and/or after any remedial action - TBC.	OAC 3745-59-33 (A)(B)(C)(D)(E)(F)(G)  OAC 3745-59-34 (A-H)  OAC 3745-59-35 (A-I)
Corrective action for waste management units (Action)	Requires an applicant for a hazardous waste permit to institute corrective action for all releases of hazardous waste or constituents from any waste management unit regardless of the time at which the waste was placed in the unit.	Pertains to all sites with land-based hazardous waste units (surface impoundments, waste piles, land treatment units, landfills). This includes existing land-based areas of contamination - applicable.  [NOTE: Corrective action will also be implemented during the Corrective Measure Implementation (CMI) process.]	OAC 3745-55-011(A)(C)(D)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Waste determination and hazardous waste analysis (Action/Chemical)	Any person who generates a solid waste must determine if that waste is hazardous by using procedures identified in 40 CFR 262.11. An overview of the hazardous waste determination procedures is presented in 40 CFR 260 Appendix I.	The specific project will assess the selected alternative for hazardous waste by reviewing the RFI database, reviewing process/historical records, and performing sampling and analysis (as required). A task-specific sampling and analysis plan will be developed to guide the required waste characterization activities - applicable.	OAC 3745-52-11 OAC 3745-54-13
Hazardous waste container management (Action)	Containers of RCRA hazardous waste will be: (1) maintained in good condition, (2) compatible with other waste streams to be stored, (3) closed during storage, and (4) managed to prevent spills or rupture.	During the remedial action, containers of various types of waste streams could be generated. Containers will be inspected and records of the inspections will be kept. Containers will be stored per applicable containment requirements - relevant and appropriate.	OAC 3745-55-71, 73 to 78
Residues of hazardous waste in empty containers (Action)	Exempts residues from empty containers when these residues have resulted from remedial action alternatives requiring storage of containers on-site.	Pertains to any alternative that incorporates storage of hazardous waste on-site in containers - relevant and appropriate.	OAC 3745-51-07
Compatibility of hazardous waste with containers (Action)	Containers holding hazardous waste must not react with the container material or liner material.	Pertains to any site at which hazardous waste will be stored in containers. The requirement is being considered relevant and appropriate because hazardous waste pending analysis may be stored at the remediation site - relevant and appropriate.	OAC 3745-55-72

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Hazardous waste accumulation time (Action)	A generator may accumulate hazardous waste on-site for 90 days or less without a permit or without having interim status.	During the remedial action, various waste streams could be generated, segregated, and temporarily staged pending analysis. The containers will be managed accordingly until disposal. The applicable requirements will be adhered to - relevant and appropriate.	OAC 3745-52-34
General closure performance standard: hazardous waste facilities (Action)	Requires that all hazardous waste facilities be closed in a manner that minimizes the need for further maintenance, controls, minimizes, eliminates or prevents post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off or hazardous waste decomposition products to the ground or surface water or the atmosphere.	Pertains to any site at which hazardous waste is to be treated, stored, or disposed of or has been treated, stored, or disposed of - applicable.	OAC-3745-55-11(A)(B)(C)
Disposal/decontamination of equipment, structures and soils (Action)	Requires that all contaminated equipment, structures and soils be properly disposed of or decontaminated.	Pertains to any site at which hazardous waste is to be treated, stored, or disposed of or has been treated, stored, or disposed of - applicable.	OAC 3745-55-14
Landfill closure and post-closure requirements (Action)	Specifies closure and post-closure requirements for hazardous waste landfills, including and not limited to final cover and maintenance.	Pertains to existing land-based areas of contamination - applicable.	OAC 3745-57-10
Hazardous waste restricted from land disposal (Action)	Provides specific requirements pursuant to hazardous wastes that are restricted from land disposal.	Pertains to any alternative that incorporates disposal of a hazardous waste on-site - applicable.	OAC 3745-59-01(C)(E)

Table B.1 Preliminary ARARs for Quadrant IV (Continued)

Action	Requirement	Prerequisites	Citation
Environmental performance standards: land-based units (Action)	Specifies location, design, construction, operation, maintenance and closure requirements for landfills, waste piles, surface impoundments, and underground injection wells.	Pertains to all sites with land-based hazardous waste units (surface impoundments, waste piles, land treatment units, landfills). This includes existing land-based areas of contamination - relevant and appropriate.	OAC 3745-57-01(A)(D) 40 CFR 267.10
Transportation for off-site disposal (Action)	EPA requires that all off-site shipments of CERCLA waste be to a properly permitted treatment, storage, and disposal facility.	In addition, all off-site shipments must comply with the administrative as well as substantive requirements of legally applicable regulations - TBC.	40 CFR 300.400
Hazardous waste shipping requirements: manifest, packaging, labeling, and placarding (Action)	A generator who transports, or offers for transportation, hazardous waste for offsite treatment, storage or disposal shall prepare and meet all hazardous waste manifesting requirements.	Prior to any offsite transportation of hazardous waste materials, all manifesting, packaging, labeling, marking, and placarding requirements shall be met - applicable.  [NOTE: If on-site transportation of hazardous waste, then - relevant and appropriate.]	OAC 3745-52-20, 22, 23, 30, 31, 32 and 33



Table B.1 Preliminary ARARs for Quadrant IV (continued)

Action	Requirement	Prerequisites	Citation
Containment of RCRA waste left in place (Action)	When a cap is being placed over waste (e.g., closing of a landfill), design and construct a cover to: (1) minimize migration of liquids through the capped area, over the long term; (2) function with minimum maintenance; (3) promote drainage and minimize erosion or abrasion of the cover; and (4) accommodate settling and subsidence so that the cover's integrity is maintained.	Applicable to RCRA hazardous waste placed at site after November 19, 1980; relevant and appropriate to waste left in place before 1980 - applicable.	40 CFR 264.310(a) OAC 3745-68-10
Post-closure care (Action)	Restrict post-closure use of property as necessary to prevent damage to the cover.	Relevant and appropriate to final closure of a SWMU with some hazardous materials or residues left in place.	OAC 3745-55-17 OAC 3745-68-10
	Ensure that post-closure care includes: (1) maintenance of the integrity and effectiveness of the final cover; (2) maintenance and monitoring of the groundwater system and compliance with all applicable parts of Subpart F, "Releases from Solid Waste Management Units;" and (3) prevention of the damage to the cover from run-on and run-off cover.	Applicable to closure of RCRA - permitted hazardous waste facilities. Relevant and appropriate to final closure of a SWMU with some hazardous materials or residues left in place.  [NOTE: See also 40 CFR 264.228(b), 40 CFR 264.310(b)]	

Table B.1 Preliminary ARARs for Quadrant IV (continued)

Action	Requirement	Prerequisites	Citation
air emissions from hazardous waste facilities (Action/Chemical)	No hazardous waste facility shall emit any particulate matter, dust, fumes, smoke, vapor or odorous substance that interfere with the comfortable enjoyment of life or property.	Pertains to any site at which hazardous waste will be managed such that air emissions may occur. Consider sites that will undergo movement of earth or incineration - applicable.	ORC 3734.02(I)
particulate ambient air quality standards (Chemical)	Establishes the specific standards for total suspended particulates. The primary standard for National Ambient Air Quality Standards (NAAQS) for particulate matter is 50 $\mu\text{g}/\text{m}^3$ annual (averaging time) and 150 $\mu\text{g}/\text{m}^3$ per 24 hours (averaging time).	Fugitive dust will be generated during loading, unloading, transportation and grading of cover material - applicable.	OAC 3745-17-02(A)(B)(C) 40 CFR Section 50

Table B.1 Preliminary ARARs for Quadrant IV (continued)

Action	Requirement	Prerequisites	Citation
Air pollution nuisances prohibited (Action)	Defines air pollution nuisance as emission or escape into the air from any source(s) of smokes, ashes, dust dirt, grime, acids, fumes, gases, vapors, odors, and combinations of the above that endanger health, safety or welfare of the public or cause personal injury or property damage. Such nuisances are prohibited.	Fugitive dust may be generated during loading or unloading of cover transportation and grading of cover material. There are minimal activities anticipated that will result in an air pollution nuisance - applicable.	OAC 3745-15-07(A)
Air discharges (fugitive dust) (Chemical/Location)	The significant deterioration of air quality is prohibited.	Wind dispersal of any debris or stockpiled soil resulting from activities associated with an alternative will be controlled - applicable.	OAC 3745-17-05
Emission Restrictions (Action)	For any fugitive dust source that may cause such a public nuisance, fugitive dust control measures must be implemented.	These controls include use of water or other suitable dust suppressants and the covering at all times of open-bodied vehicles when transporting materials likely to become airborne. Canvas or other suitable coverings must be used. Small sources of fugitive emissions are exempt from air-permitting requirements if the emissions of air contaminants can demonstrably be held to less than 10 lb per day - applicable.	OAC 3745-17-08(B)

Table B.1 Preliminary ARARs for Quadrant IV (continued)

Action	Requirement	Prerequisites	Citation
<p>emission Restrictions (Action) (continued)</p>		<p>All emissions of dust shall be controlled. Considered for all sites which may undergo grading, loading operations, demolition, clearing and construction - relevant and appropriate.</p>	<p>OAC 3745-17-08A(1) thru A(2) OAC 3745-17-08(D)</p>
<p>emission of radionuclides to atmosphere (HESHAP) (chemical)</p>	<p>Subpart H of 40 CFR 61 addresses atmospheric radionuclide emissions from DOE facilities and may be applicable to airborne emissions during remedial activities. EPA has issued a final NESHAP for amounts that would not cause any member of the public to receive an effective dose equivalent of 10 mrem/year or more.</p>	<p>Title 40 CFR 61.93(b)(4)(i) requires radiological emission measurements at all release points that could discharge radionuclides into the air in quantities that could cause an effective dose equivalent in excess of 1% of the standard 0.1 mrem/year. All radionuclides that contribute greater than 10% of the standard 1 mrem/year for a release point shall be measured - applicable.</p>	<p>40 CFR 61</p>
<p>control of emissions of organic materials from stationary sources (Action)</p>	<p>All air discharges resulting from equipment or other stationary sources that may emit VOCs to the atmosphere will meet substantive requirements as permitted.</p>	<p>No persons shall cause or allow emissions of an air contaminant to the atmosphere without a permit - applicable.</p>	<p>OAC 3745-21-07 ORC 3704.05</p>
<p>worker health and safety (Action)</p>	<p>Response actions under the NCP will comply with the provisions for response action worker safety and health in 29 CFR 1910.120.</p>	<p>All governmental agencies and private employers are directly responsible for the health and safety of their own employees - relevant and appropriate.</p>	<p>40 CFR 300.150</p>

Table B.1 Preliminary ARARs for Quadrant IV (continued)

Action	Requirement	Prerequisites	Citation
Occupational-worker protection (TBC)	The safety and health standards for general construction presented in 29 CFR 1926 will be followed. The OSIIA standards are incorporated into DOE Order 483.1A. The specific requirement will be identified in the task-specific health and safety plan.	The proposed remedial action alternative will be implemented in accordance with applicable OSIIA general construction standards. The OSIIA standards will apply on their own merit as required through DOE Order 5483.1A - TBC.	29 CFR 1910.120
Occupational worker protection health and safety documentation (TBC)	Employers shall maintain and implement a written safety and health program for their employees involved in hazardous waste operations. All occupational safety and health requirements of 29 CFR 1910 and 1926 are to be followed. In case of a conflict or overlap, the most protective provision will apply.	The proposed remedial action alternative will be implemented in accordance with the provisions of DOE and Portsmouth Gaseous Diffusion Plant Comprehensive Occupational Safety and Health Program. As specified in 29 CFR 1910.120(b)(4), a task-specific health and safety plan will be developed - TBC.	29 CFR 1910.120(b)(4)
Radiation protection of the public (TBC)	Exposures of members of the public to radiation sources as a consequence of all routine DOE activities will not cause, in a year, an effective dose equivalent greater than 100 mrem from all exposure pathways.	Precautions will be taken through the use of appropriate controls to minimize exposure to the public - TBC.	DOE Order 5400.5, Chapter II, Section 1.A

Table B.1 Preliminary ARARs for Quadrant IV (continued)

Action	Requirement	Prerequisites	Citation
Radiation protection of the public (continued) (TBC)	<p>Specific authorizations may be received for a temporary increase of the dose limit up to 500 mrem in a year.</p> <p>The derived concentration guides (DCGs) are provided as reference values for conducting radiological environmental protection programs at operational DOE facilities and sites. DCG values are presented in DOE Order 5400.5 for the following exposures modes:  (1) ingestion of water  (2) inhalation of air  (3) immersion in a gaseous cloud</p>	<p>The DCG values for internal exposure are based on a committed effective dose equivalent of 100 mrem for the radionuclide taken into the body by ingestion or inhalation during one year - TBC.</p>	<p>DOE Order 5400.5 Chapter III</p>
Facility design requirements (Action)	<p>The final cap system design shall be certified by a Professional Engineer. The applicable drawings, calculations, etc. shall meet the necessary requirements of this rule. The criteria identified for Final Cap System Design Plans shall meet construction and performance specifications for soil compaction, particle size, plasticity properties per ASTM D 2487, and ASTM D 422. The soil will not consist of solid waste or additional construction and demolition debris.</p>	<p>The X-734 Landfill Final Cap System will meet lift and slope requirements and standards needed to ensure growth of dense vegetation. These factors will also prevent ponding and improper draining which will minimize erosion. The substantive portions of these requirements will apply to all phases of the remedial action taken. DOE will provide opportunity for Ohio EPA review of any plans generated pursuant to this cap and other phases of this remedial action - applicable.</p>	<p>OAC 3745-400-07(G)(2)</p>

Table B.1 List of Acronyms

ARARs	Applicable or relevant and appropriate requirements
BAT	Best Available Technology
CAA	Clean Air Act
CAS/CMS	Cleanup Alternatives Study/Corrective Measures Study
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMi	Corrective Measures Implementation
CWA	Clean Water Act
DCG	Derived Concentration Guide
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FR	Federal Register
HOC	Halogen Organic Compounds
LDR	Land Disposal Restrictions
LLW	Low-level radioactive waste
MCL	Maximum Contaminant Level
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
O&M	Operations & Maintenance
OAC	Ohio Administrative Code
ORC	Ohio Revised Code
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated Biphenyls
PORTS	Portsmouth Gaseous Diffusion Plant
ppm	parts per million
PTI	Permit to Install
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SHPO	State Historical Preservation Officer
SOPs	Standard Operating Procedures
SWMU	Solid Waste Management Unit
TBC	To be considered
TSCA	Toxic Substances Control Act
TSD	Treatment Storage and Disposal
USC	United States Congress

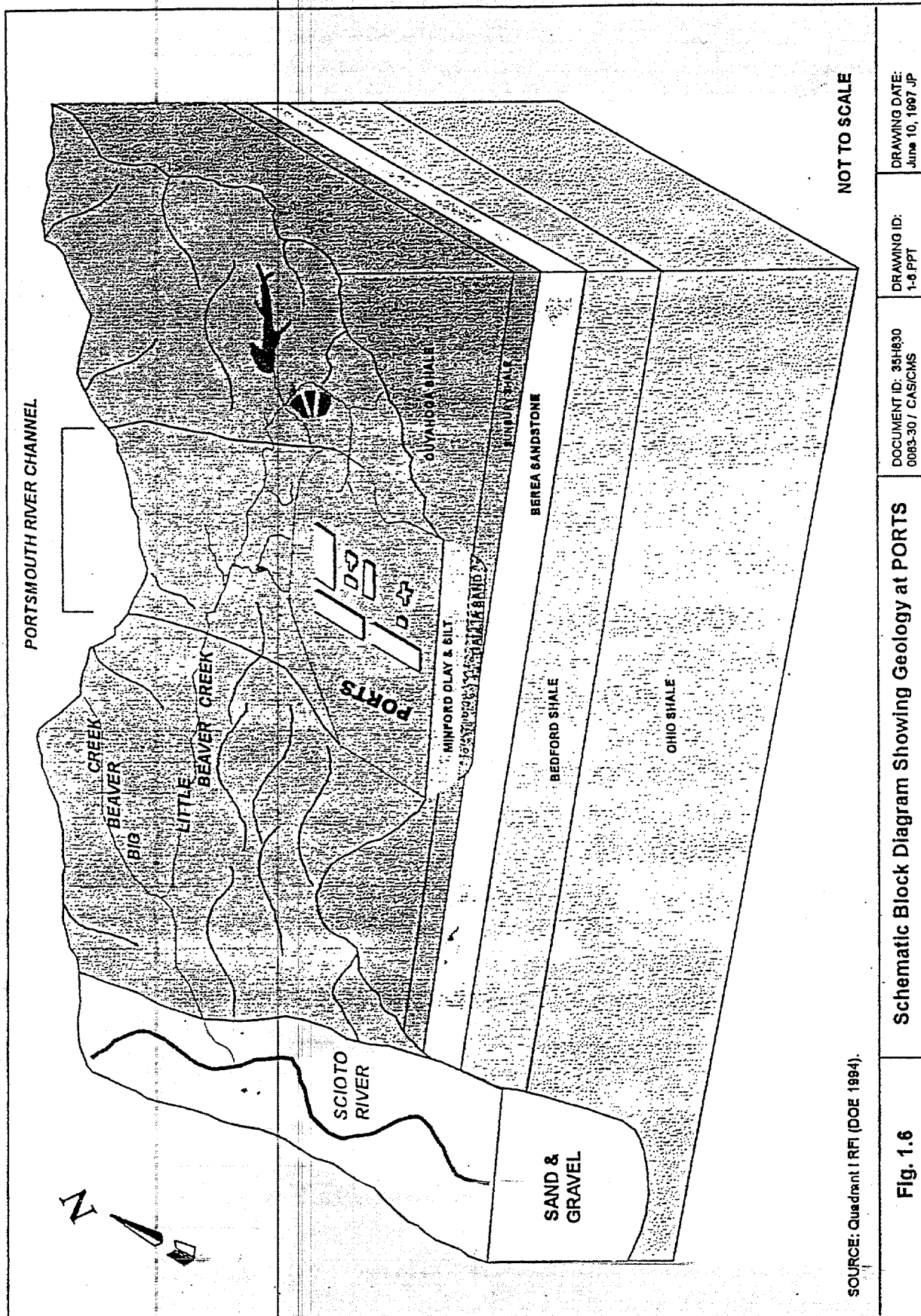
## APPENDIX 2

### FIGURES



## **APPENDIX 2**

### **FIGURES**



SOURCE: Quadrant I RFI (DOE 1994).

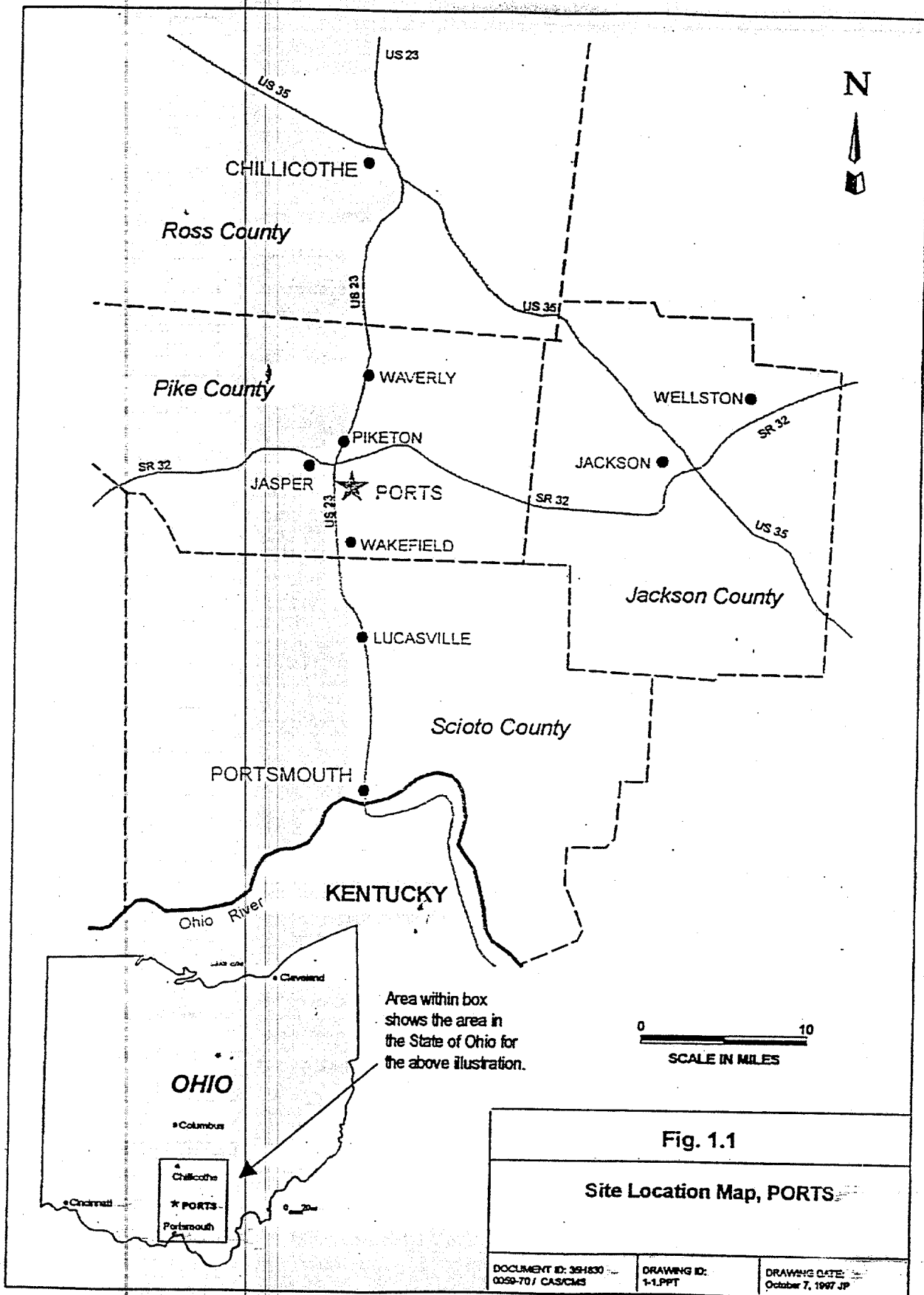
Fig. 1.6

Schematic Block Diagram Showing Geology at PORTS

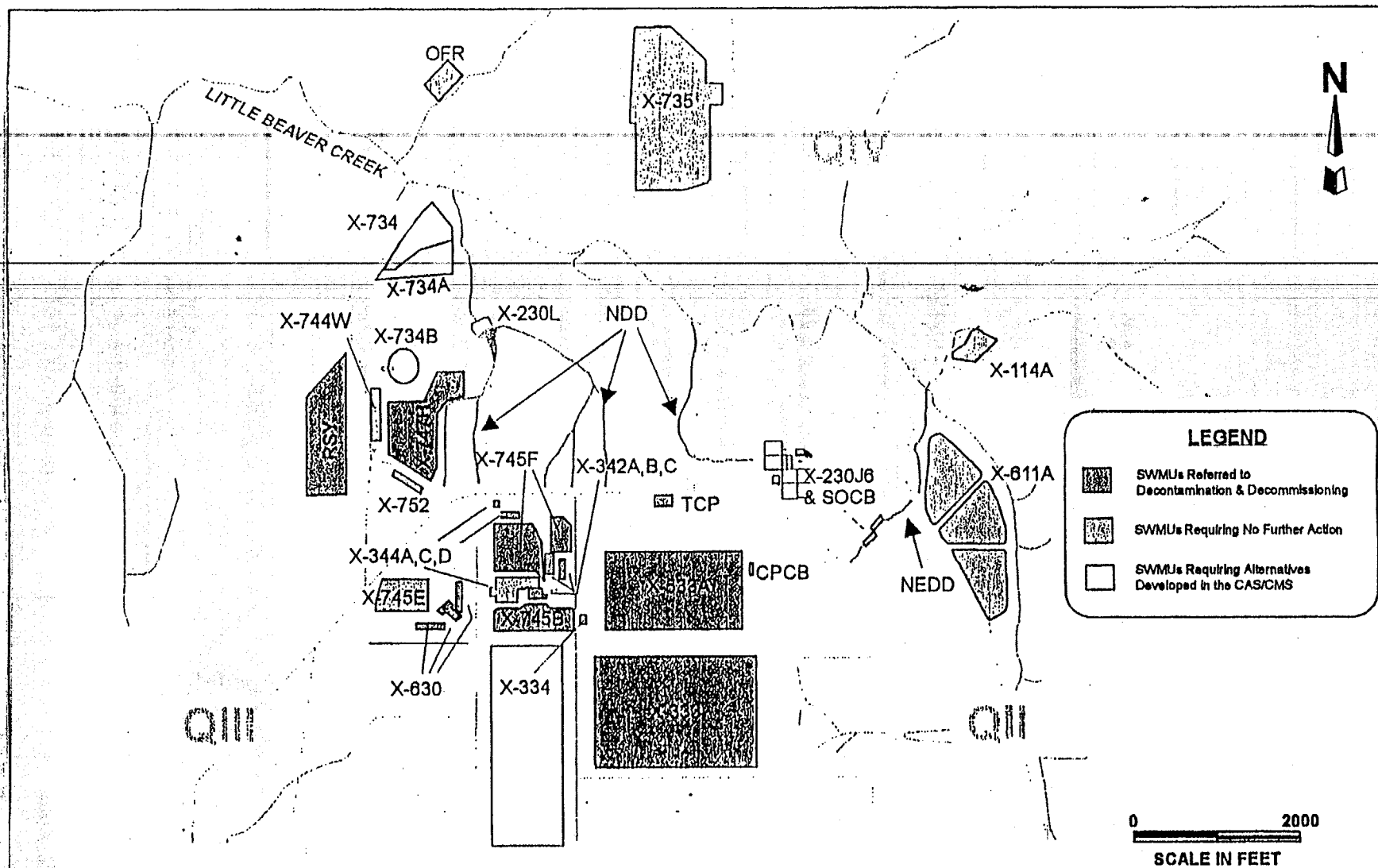
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0083-30 / CAS/CMS

DRAWING ID:  
1-6 PPT

DRAWING DATE:  
June 10, 1997 JP







SOURCE: Quadrant IV RFI (DOE 1994).

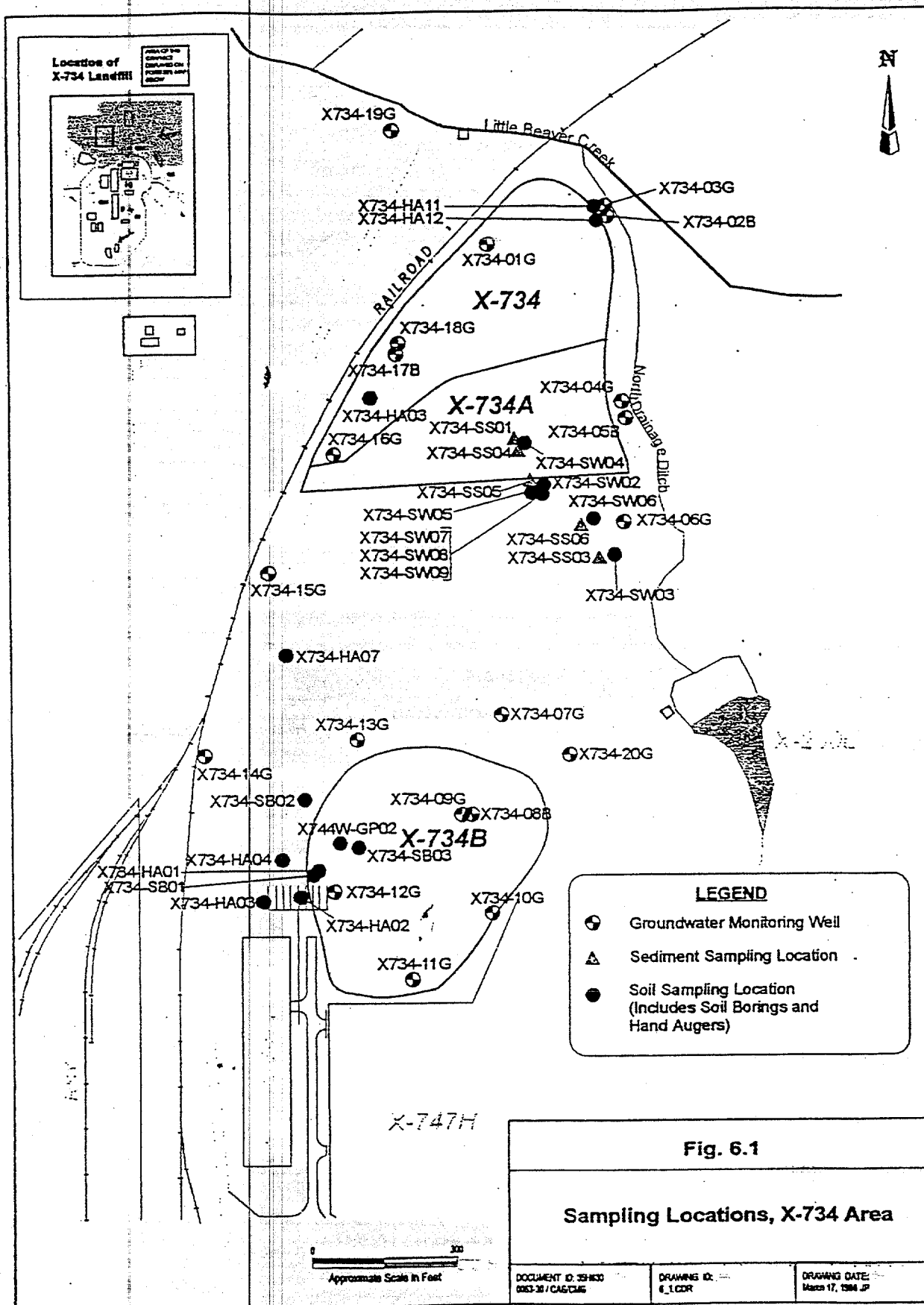
Fig. 2.1

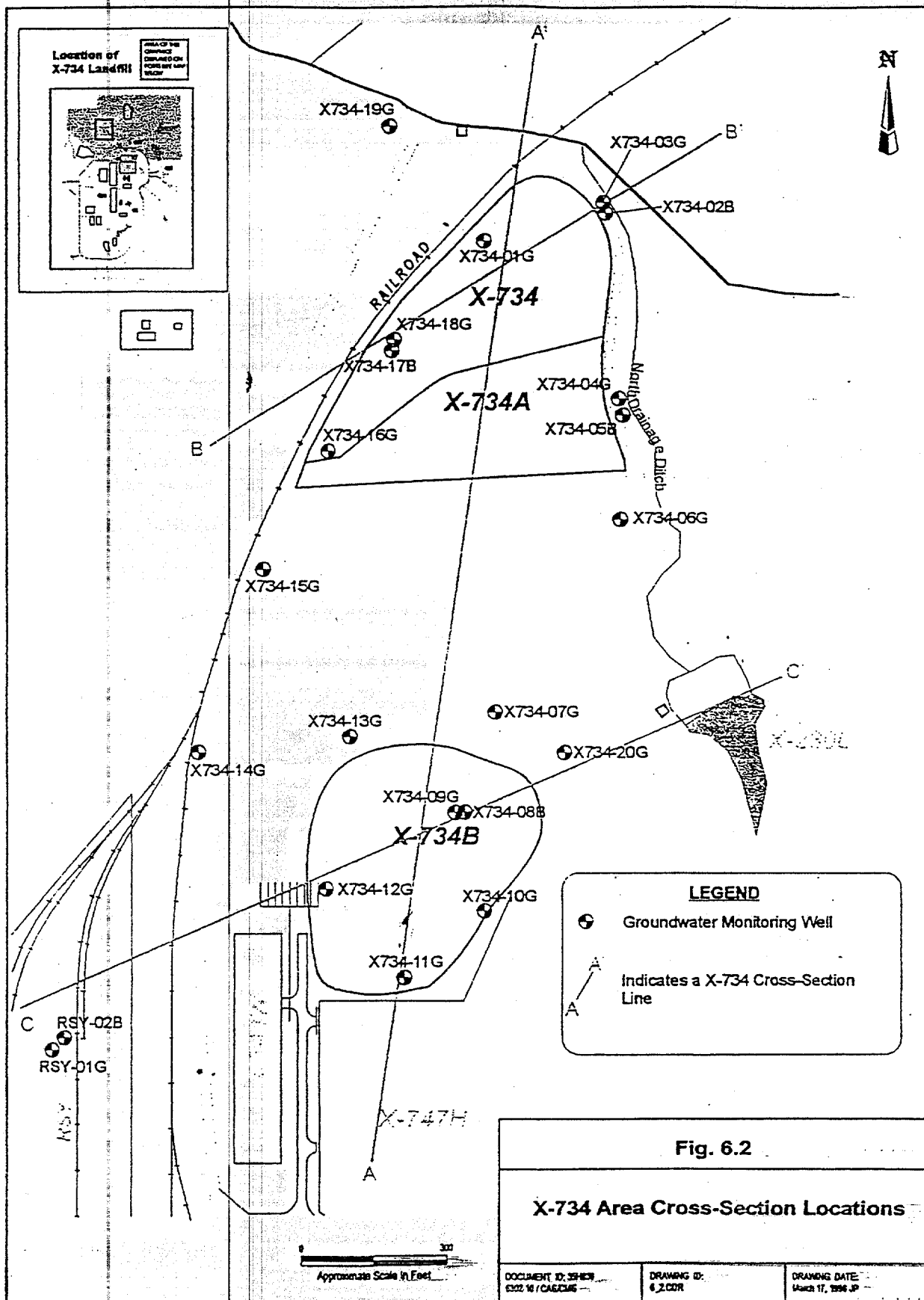
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0063-30 / CAS/CMS

DRAWING ID:  
2.1.PPT

DRAWING DATE:  
December 18, 1997





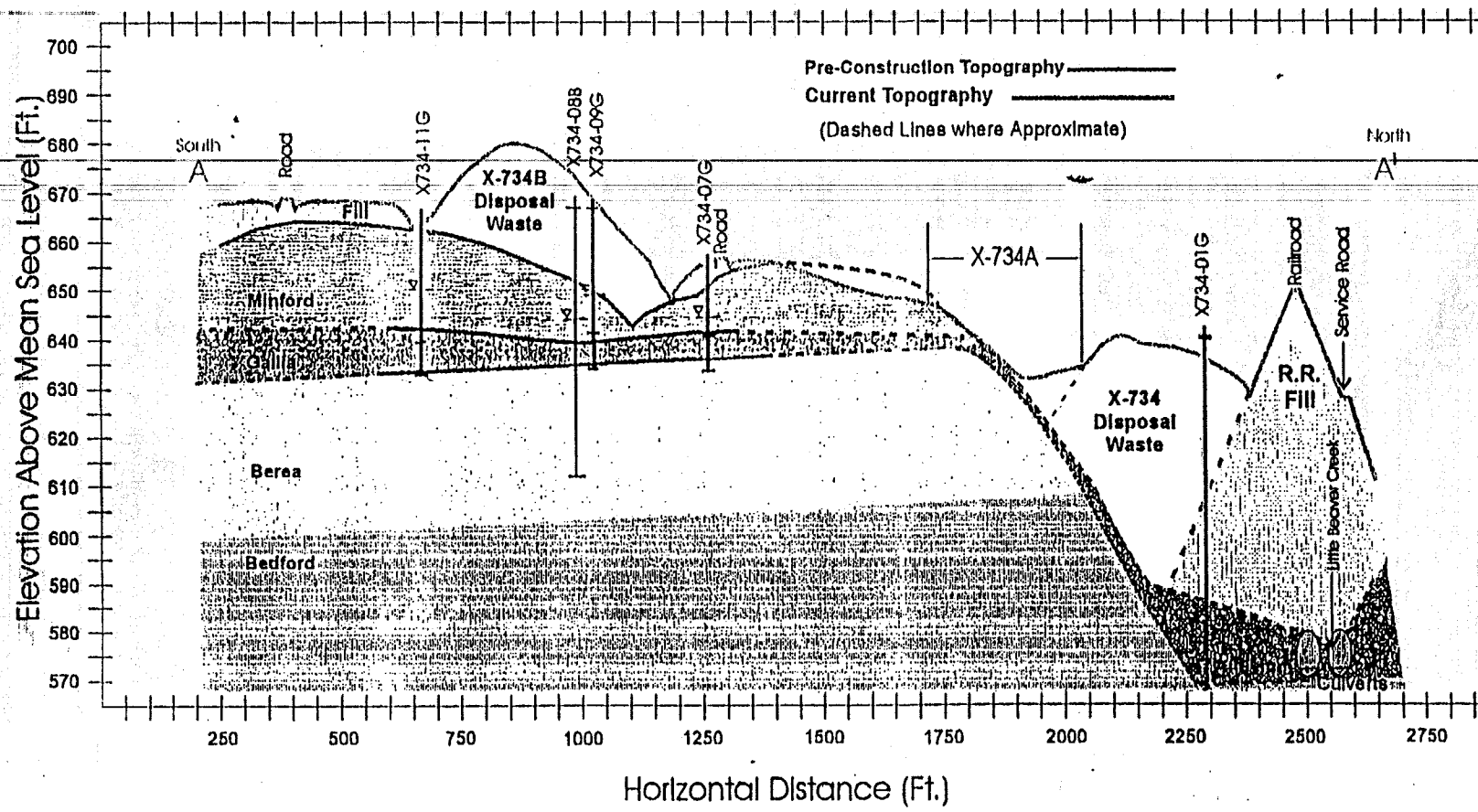


Fig. 6.3

Cross-Section A - A' of X-734 Area

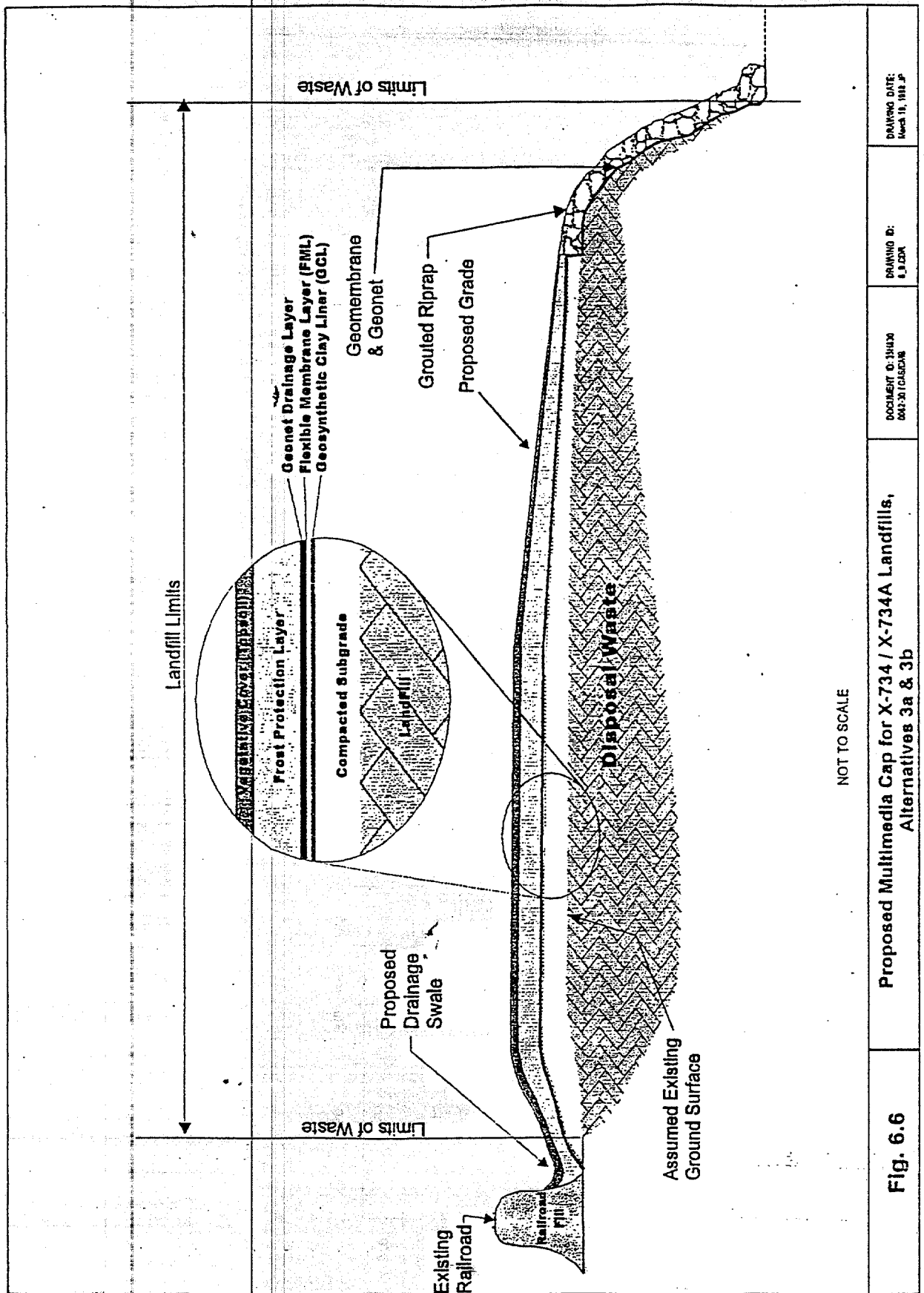
DOE - PORTS, Quadrant IV - Piketon, Ohio

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0063-30 / CAGICMS

DRAWING ID:  
A\_734.CDR-1

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March 19, 1998 JP





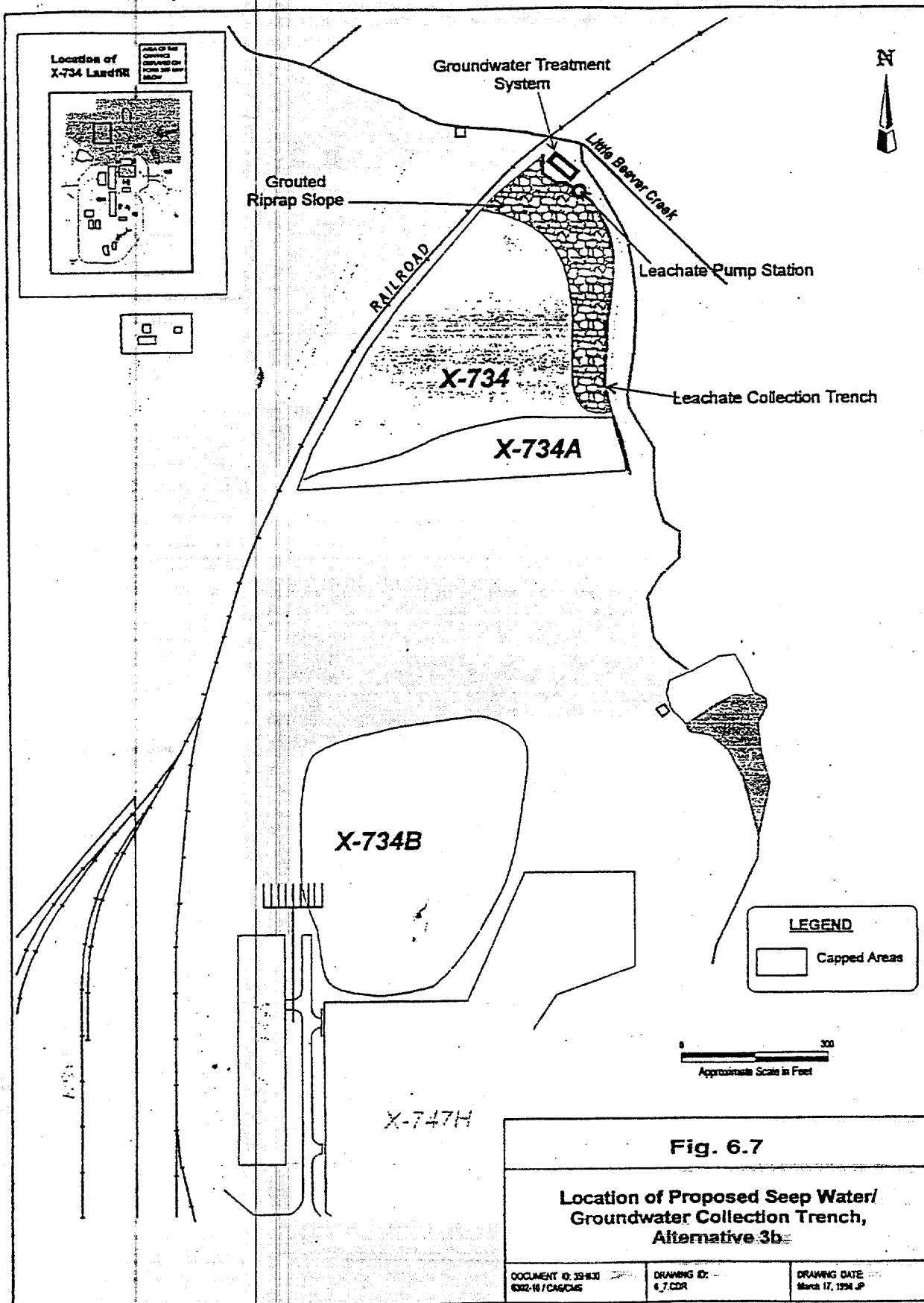
**Fig. 6.6**

**Proposed Multimedia Cap for X-734 / X-734A Landfills,  
Alternatives 3a & 3b**

DOCUMENT ID: 31400  
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DRAWING ID:  
6.3.20A

DRAWING DATE:  
March 18, 1998 JP



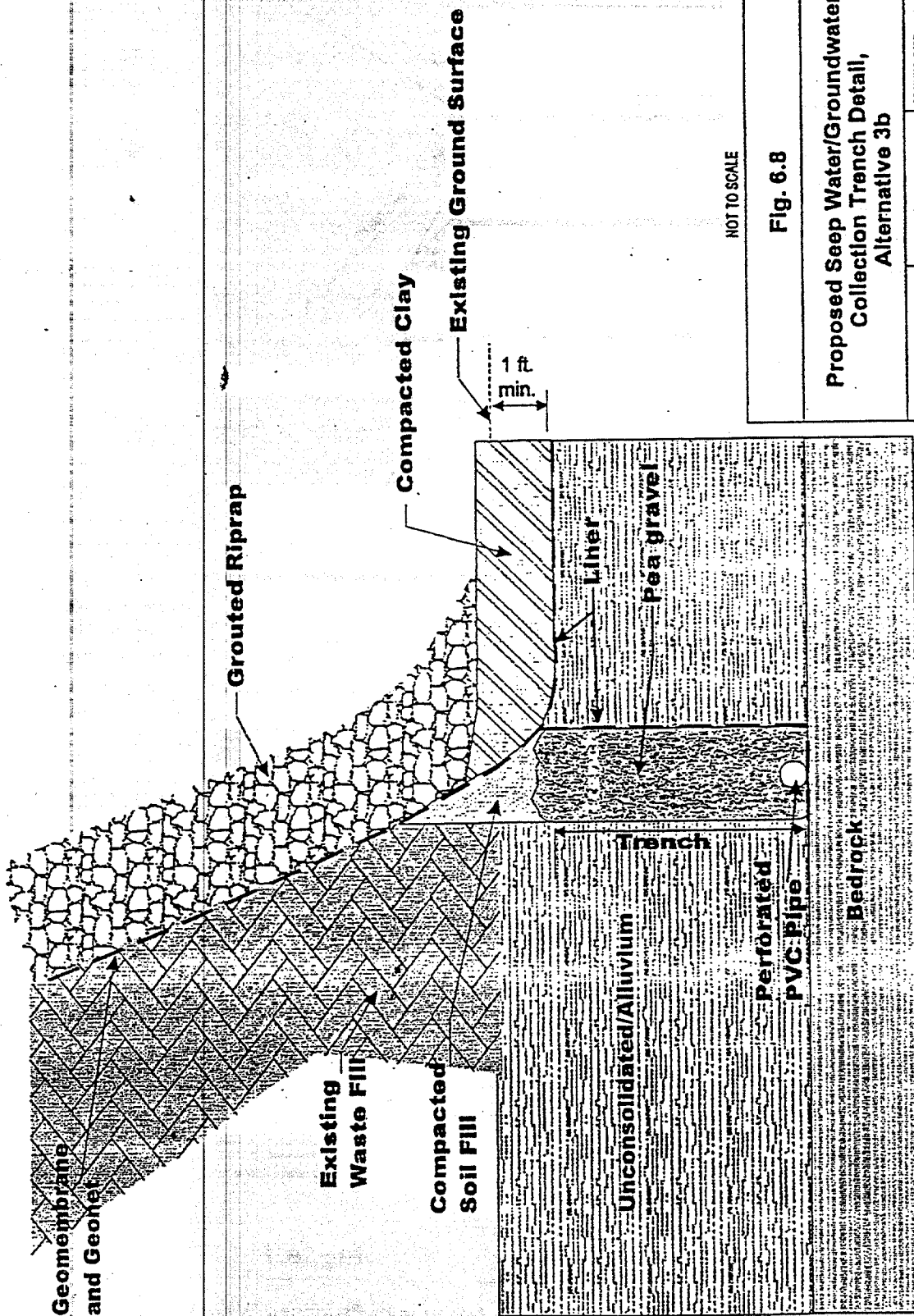


Fig. 6.8

Proposed Seep Water/Groundwater  
Collection Trench Detail,  
Alternative 3b

DOCUMENT C-38433  
000130700000

DRAWING ID:  
1.1 COR

DRAWING DATE:  
March 18, 1994